Computers in Human Behavior 152 (2024) 108083

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Understanding and predicting customers' intentions to use smartphone-based online games: A deep-learning-based dual-stage modelling analysis

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ARTICLE INFO

Handling Editor: Matthieu Guitton

Keywords:
Online gaming
Smartphone
Attitude
Perceived flow
Customer intention
PLS-SEM
Artificial neural network

ABSTRACT

Building upon flow theory, the present research empirically investigates the impact of customers' attitudes on their intention to use smartphone-based online gaming. It also examines the mediating effects of customers' perceived flow and engagement between attitudes and customer's intention to use smartphone-based online gaming. Furthermore, customers' cognitive involvement was also examined as a moderator in between attitude and perceived flow. The data were analysed using a dual-stage hybrid method embedded with PLS-SEM and ANN. A sample of 688 smartphone-based online game players was surveyed, and the results support the notion that customers' attitudes, considered as a formative construct, significantly influence intention to use smartphone-based online gaming. The study further confirms that perceived flow and customer engagement mediate the relationship between attitudes and intention to use smartphone-based online gaming. The study also identifies the role of cognitive involvement as a significant moderator in between customers' attitudes and perceived flow. Contributions for both theory and practice are presented in the concluding sections.

1. Introduction

Competition among the developers of the web-based gaming sector in the Asia-Pacific zone has been intensifying since 2018 and accounts for almost 62.00% of all app-based game revenue globally, reaching around USD 63.20 billion in total (Chen, 2022; Sarkar & Sarkar, 2022). This phenomenal growth and progress have created a new opportunity for mobile phone-based online gaming marketers to urgently understand the dynamics of customer attitudes in developing games to reach a significant segment of target customers who use smartphones. This can be achieved by engaging them, creating a positive flow, and involving them cognitively in using a smartphone to access for online gaming (Kim & Kim, 2022).

The utilization of smartphones for playing online games has surged due to the rapid development of smartphone technology. According to Yavuz, Çorbacıoğlu, Başoğlu, Daim, and Shaygan (2021), Mehra, Rajput, and Paul (2022), and Nugraha, Silintowe, and Paramita (2022), this trend has become more prevalent. In Bangladesh, the online smartphone-based gaming market is growing at an exponential rate, with a valuation of BDT 80 billion and 2.5 billion active customers who regularly play online games on their smartphones (Jakir, 2021). Bangladesh, which ranks seventh in terms of the global population, has a significant proportion of young people, making the smartphone-based gaming market in the country an essential focus for marketers to stay competitive and adequately positioned (Hussain, 2021).

A considerable amount of research has explored the scope of online video games in the perspective of customers' switching behaviour (Bourgonjon, Valcke, Soetaert, & Schellens, 2010; Dale & Shawn Green, 2017; Huang, Young, & Fiocco, 2017), adoption of online games (Okazaki, 2008; Rauschnabel, Rossmann, & Tom Dieck, 2017; Zhou, 2013),

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https://doi.org/10.1016/j.chb.2023.108083
Received 26 September 2022; Received in revised form 16 September 2023; Accepted 7 December 2023
Available online 14 December 2023

customers' buying behaviour and loyalty towards online games (Cheung, Leung, Chang, & Shi, 2021, Dahabiyeh, Najjar, & Agrawal, 2021, Kunkel, Lock, & Doyle, 2021), promotional and advertisement strategy of online games (Abbasi, Rehman, Hussain, Ting, & Islam, 2021; Débordès, Caporossi, & Larocque, 2021; Wang, Tan, Yuan, Ooi, & Dwivedi, 2022), players' experience in online games (Laato, Rauti, Islam, & Sutinen, 2021; Liao & Chiu, 2021) and the dark side of online games (Hilvert-Bruce & Neill, 2020; Ortiz, 2019). Despite of the growth of smartphone-based online games (Hoque, 2018; Ramírez-Correa, Rondán-Cataluña, Arenas-Gaitán, & Martín-Velicia, 2019; Yamaguchi, 2023), there is a lack of studies on assessing customers' attitudes and their intention to use smartphones based online gaming behaviour in consumer behaviour and information system-based literature.

Thus, a limited comprehension of the sub-dimensions that influence the attitude construct of smartphone-based online game players is hindering managers and design engineers from utilizing them for business development. As a result, managers must devise strategies to foster a positive flow in the utilization of smartphones for online gaming to enhance user engagement in gaming platforms (Muniz & O'guinn, 2001; Kuo & Feng, 2013).

Moreover, as mentioned by researchers such as Huang and Korfiatis (2015), Salo (2015) and Wehden, Reer, Janzik, Tang, and Quandt (2021) and Reer, Wehden, Janzik, Tang, and Quandt (2022), understanding the customers' attitude formation, its effect on engagement and perceived flow enables managers in this smartphone-based gaming industry to understand and predict the player's fundamental online gaming behaviours. This may provide a wide range of strategic guidelines for gaming developers to position their games and achieve a return on investment. These arguments and findings strongly justify that understanding customers' attitudes toward using smartphones for playing online games and their intention to use smart-phones for online gaming are the key areas for the game developers where the present study may further add value to the body of knowledge.

This study also justifies its theoretical foundation of "flow", which is developed by Csikszentmihalyi (1975a, 1975b, 1988). It is a popular model for understanding the integrating sensation of customers' overall feelings and optimal mental state when they are fully engaged while playing online games (Hoffman & Novak, 1996). Meanwhile, smart phones with internet connections provide an online gaming environment where flow and engagement must be generated to involve customers (Hoffman & Novak, 1996, 2009; Koufaris, 2002; Lee & Chen, 2010, pp. 1–11; Novak et al., 2003). Consequently, this research intends to inspect and explain the relationship between customers' attitudes and their intention to use smartphone-based online gaming and the mediating roles of engagement (Chen, 2022; Chen, Hsu, & Lu, 2018) and perceived flow (Huang & Hsieh, 2011; Liu, 2017) on this relationship. Moreover, we further examine the moderating role of cognitive involvement (Li & Browne, 2006; Mollen & Wilson, 2010) on the hypothesized relationships between consumers' attitudes and perceived flow.

Furthermore, individual gamers who are in the flow and engagement have more favourable attitudes to demonstrate a positive intention to use smartphones and repeatedly play online games on that particular gaming platform (smartphone) (Hoffman & Novak, 1996). In the online gaming environment, flow is related to repetitive playing behaviour where customers are heavily engaged in their activities in the virtual gaming world (Animesh, Yang, & Oh, 2011; Chou & Ting, 2003; Hsu & Lu, 2004). Thus, the present research suggests that customer engagement and perceived flow towards using smartphones for online gaming are likely to present between their attitude and intention to use smartphone-based online gaming. Hence, the present research moves through the following four stages of empirical investigative.

a) It postulates and statistically tests a higher-order construct, i.e., attitude towards using smartphone-based online games.
b) It examines the direct effect of attitude towards using smartphone-based online gaming, engagement and perceived flow on customer's intention to use smartphone-based online gaming.
c) It tests the mediation effect of engagement and perceived flow between attitude and the intention to use smartphone-based for online gaming.
d) The study examines the moderating role of customer's cognitive involvement on the relationship between the attitude and perceived flow.

The present study add values to the consumer behaviour and information system literature on online gaming in substantial ways by incorporating the higher-order constructs of customers' attitudes towards using smartphone-based online gaming, customer engagement, perceived flow, intention to use a smartphone-based online gaming and cognitive involvement. The connections between the variables above have only received inadequate research. In fact previous researchers have paid considerable attention to the mentioned variables to be studied in future under the scope of online gaming industry (Brockmyer et al., 2009; Choi & Kim, 2004; Chou & Ting, 2003; de Hesselle, Rozgonjuk, Sindermann, Pontes, & Montag, 2021; Hellström, Nilsson, Leppert, & Åslund, 2015; Hsu & Lu, 2007; Kuss & Griffiths, 2012; Smith, Gradisar, King, & Short, 2017). Most empirical studies are either based on conceptual or only apply multivariate data analysis tools such as structural equation modelling (SEM) in customers' behaviour towards online gaming. This study is one of the first research attempts to apply dual modelling methods to understand customers' online gaming behaviour by using smartphones. We applied a dual-steps analytical tools for examining the proposed conceptual model derived in this study. In the first phase of the study, we tested the hypothesized relationship by applying PLS-SEM to understand the impact of customers' attitudes towards using smartphones for online gaming, engagement and perceived flow towards customers' intentions to use smartphones for online gaming.

In the second phase of research, we operationalised artificial neural network (ANN) modelling method to rank the required antecedents and validate the findings that generates from Partial Least Square based Structural Equation Modelling (PLS-SEM) outcomes.

Like previous research such as Ooi and Tan (2016), Hew, Badaruddin, and Moorthy (2017) and Giovanis, Rizomyliotis, Konstantoulaki, and Magrizos (2022), the present conclusive research applied the deep learning dual-stage research design to analyze the data (i.e., SEM-ANN) approach. The present study adopted this method to prove the acceptability of the proposed hypothesized relationship (See Fig. 1). The results of PLS-SEM may reflect the considerable effect on predictors and only investigate the linear relationships, whereas the deep ANN architecture model assists us in identifying the study constructs' rank via sensitivity analysis (Abbasi, Goh, Iranmanesh, & Liebana-Cabanillas, 2023). The results generated from applying conventional multiple regression base analysis such as SEM sometimes do not assist managers in making decisions only based on the linear model (Leong, Hew, Tan, & Ooi, 2013). Adopting ANN may beneficial to overcome this concern, as this method allows managers to identify non-linear and non-compensatory relationships (Leong et al., 2013). The results generated from ANN modelling are highly robust and adaptable, providing more prediction precision than linear models (Liébana-Cabanillas, Marinković, & Kalinin, 2017, 2018). Therefore, in this study, ANN methods complement the findings from PLS-SEM. As the ANN method can detect both linear and non-linear relationships (Sharma, 2019; Sharma, Dwivedi, Arya, & Siddiqui, 2021), rather than only just linear relationships with regards to customers' intention to use smart-phone platforms for online gaming. The study applied a consecutive multi-method data analysis process from the evidence of customers' intentions to use smartphone-based platforms for online gaming, which need to be explored and examined via alternative data analysis approaches to addressing epistemological and practical issues

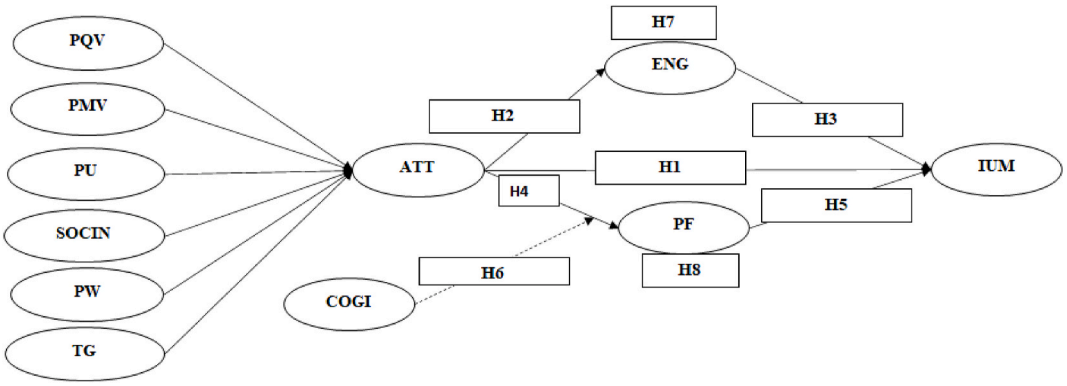

Fig. 1. Proposed conceptual model.

(Bergman, 2020; Sharma, 2019). The application of ANN may not only complement the findings generated from PLS-SEM but also confirms the reliability in process of the validation of the study constructs (customers' attitudes, cognitive involvement, engagement, perceived flow, intention) (Arpaci & Bahari, 2023; Lo et al., 2022; Priyadarshinee, Raut, Jha, & Gardas, 2017). Above all, the dual method of analysis generates in-depth predictive modelling that can overcome the shortcomings of the present conceptual model by offering a predictive analysis of customers' attitudes toward using smartphone-based online gaming.

The subsequent parts of the manuscript present the literature review, conceptual model and hypotheses development, methodology, data analysis and discussion of key findings. The study also accomplishes a discussion of theoretical and managerial implications and limitations.

2. Theoretical background

Scholars of information technology in the field of gamification have identified several factors in forming attitudes towards online gaming (Ghosh, Sreejesh, & Dwivedi, 2021). Still, it remains unclear what the key psychological factors forming customers' attitudes and how they are related to the intention to use smartphone-based for online gaming (Rosendo-Rios, Trott, & Shukla, 2022). This study has conceptualized attitudes toward using the smartphone-based online gaming as a second-order formative construct encompassing perceived emotional values, quality, social influence, technology gratification, usefulness and well-being (Hsiao & Chen, 2016; Nakamura, 2019). In psychology, it was observed that attitude is the general and lasting formation of emotion, beliefs and behaviour towards any object, person or thing or specific issue (Suci, Wang, & Doong, 2022).

Customers perceived emotional value refers to the utility generated from feelings and affective states that form an attitude (Hsiao & Chen, 2016). Research evidence that customers are now showing their gaming attitude due to achieve self-fulfilment, excitement and happiness (Schänzel, Taylor-Giles, & Turner, 2022). A few studies have also identified the significance of emotional value in forming an attitude towards smartphone-based online gaming (Shiau & Huang, 2022) and Gros, Debue, Lete, and Van de Leemput (2020) found a positive relationship between emotional value and attitude.

Meanwhile customers perceived quality is an important predictor in forming attitudes (Liu & Li, 2011). Hsiao and Chen (2016) emphasized the perceived quality when mentioning that the enjoyment of a game is that a player can play online games anytime from anywhere.

Social influence is the extent to which individuals perceive others' beliefs as important in making their decisions regarding forming their attitudes. Therefore, when people find that their peer group becomes more engrossed in playing online mobile games, they feel more inclined and motivated to play the games (Baabdullah, 2018).

Technology gratification is the extent of fulfilment when playing online games using smartphones and is a kind of behaviour that forms attitudes (Jang & Liu, 2020). Technology gratification forms the attitude towards technology, which influences people to pass the time as entertainment (Engl & Nacke, 2013). Nowadays online smartphone-based games have taken the place of physical games as these games have become one of the major sources of entertainment for customers (Hamari, Malik, Koski, & Johri, 2019).

Usability is an emergent concept in the online gaming industry (Breitkreuz et al., 2021). Perceived usability refers to the idea of how a human interacts with online mobile gaming with effectiveness, efficiency and satisfaction (Oghuma, Libaque-Saenz, Wong, & Chang, 2016). Wang and Senecal (2007) identified usability as one of the key constructs of attitude formation. Researchers in online gaming and mobile gaming have also studied customers' well-being and gaming intention (Kirby, Jones, & Copello, 2014). Zhang and Kaufman (2017) found that for psychological well-being people become more important while playing online mobile games. Goh, Jones, and Copello (2019) studied the motivation towards playing online games and found that psychological well-being works as an antecedent towards the attitude.

Psychological well-being indicates customer's evaluation of the product or service attributes that impact their individual improvement regarding quality of life in their attitudinal aspect during their product consumption (Houben, Van Den Noortgate, & Kuppens, 2015). In addition, customer's psychological well-being is not restricted to their quality-of-life satisfaction in consuming the products or services; instead, it is also about their overall experiences embedded with positive or negative emotions in their respective life (Kim & Kim, 2020). In regards to leisure time activities, playing smartphone-based online games also requires customers to use an attitude-specific skill to achieve the objective in the gaming environment. These activities in the game can create a spring of attitude in the users to create a special meaning for their psychological well-being in real-life phenomena (Kim, 2021; Kim & Kim, 2020). Customer engagement is a psychological perspective of the individual customer that emphasizes the customer's selection of particular brand-relevant interactions or behavioural responses (Carlson, de Vries, Rahman, & Taylor, 2017; Harmeling, Moffett, Arnold, & Carlson, 2017). Thus, customer engagement is one of the key constructs that tend to influence a customer's intention to purchase an object, and a conclusive attitude towards a specific thing also enhances the customer's preference (Pansari & Kumar, 2017; Prentice, Han, Hua, & Hu, 2019; Venkatesan, 2017). The present research conducted under the paradigm of flow theory, flow is defined as a customer's optimal psychological experience due to the involvement of their unconsciously engaged activities, such as hobbies, events, sports and so on (Hsu, Chang, & Chen, 2012). The concept of flow has been enormously tested in literature on information and communication technology (Kim & Han, 2014; Schiopu, Hornoiu, Padurean, & Nica, 2022). Based on this literature evidence, the concept of flow denotes the system in which a customer may enter an experiential mode to complete a fascination influenced by their attitude (Chen et al., 2018; Mustafi & Hosain, 2020).

When experiencing flow, customers become highly focused, and they always respond only to a specific intention to perform or target to achieve (Chen et al., 2018). Finally, previous research on attitude has also shown the high degree of influence of a customer's cognitive response on perceived flow (Javornik, 2016; Thissen, Menninghaus, & Schlotz, 2021). Thus, the customer's cognitive involvement moderates the relationship between the customer's attitudes and flow (Chang & Wang, 2008; Sundar et al., 2012; van Noort et al., 2012).

3. Research model and hypotheses development

3.1. Customer's attitudes and intention to use smartphone-based online gaming

Attitude has different attributes which determine the behavioural intention towards any technology (Davis, 1989). Attitude has a significant positive association with behavioural intention (Yeo, Goh, & Rezaei, 2017) and a person's attitude would influence someone to respond to a particular thing (Ajzen & Fishbein, 1977). Kuo and Yen (2009) found relationship between customer's attitude and intention. An individual's favourable attitude towards technology leads them to use that technology (Rezaei, Shahijan, Amin, & Ismail, 2016). Zhu, Lin, and Hsu (2012) found a positive association between attitude towards online mobile games and intention to use them. Thus, the following hypothesis can be proposed for further empirical examination.

H1. Customers' attitudes have a positive relationship with the intention to use smartphone-based online games.

3.2. Customer's attitudes and engagement

Previous studies have identified positive and significant relationships between attitude and online gaming engagement (Spears & Singh, 2004). Yang, Asaad, and Dwivedi (2017) mentioned that several attributes that form attitude create a strong emotional engagement toward gamification. Joseph and Diack (2015) found a significant positive relationship between attitude and engagement towards the mobile gaming of students. Thus, the present study proposed the following hypothesis.

H2. Attitudes of smartphone-based online games have a positive relationship with customer engagement.

3.3. Engagement and intention to use smartphone-based online gaming

Consumer engagement is a psychological matter which simply accounts for behaviours (Abbas, Gao, & Shah, 2018). Engagement is an emotional state that leads to the intention to use any technology (O'Brien, 2010). Vivek, Beatty, Dalela, and Morgan (2014) specified that engagement is an expression of customers' interest, psychological and motivational state towards any technology. Hollebeek, Glynn, and Brodie (2014) also stated that consumer engagement is the evaluation of perception and emotion that leads to the intended behaviour. In the mobile-based online gaming industry, highly engaged consumers with online mobile games tend to maintain valued relationships with them and incorporate them into play (Kim & Baek, 2018). Bitrián, Buil, and Catalán (2021) found that user engagement has a positive and significant relationship with online mobile gaming. Hence, we formulate the following hypothesis.

H3. User's engagement in using smartphone-based online gaming has a positive relationship with the intention.

3.4. Customer's attitudes and perceived flow

Ho and Kuo (2010) have studied the relationship between attitude and flow. They have found attitude toward technology has a positive and significant relationship where technology usage attitude acts as a determinant of flow. Technology enjoyment is a crucial factor that has a direct and positive correlation with technology (Skadberg & Kimmel, 2004). Flow theory emphasizes that positive reinforcement will be gained through a positive attitude toward something (Sheldon & Prentice, 2019). Marszalek (2006) found a positive and significant relationship between attitude and flow experience. Thus, this study proposes the following hypothesis.

H4. Customers' attitudes toward smartphone-based online games have a positive relationship with the perceived flow.

3.5. Perceived flow and intention to use smartphone-based online gaming

Little research on technology adoption and online consumer behaviour has focused on flow experience relating to intention behaviour (Martins, Costa, Oliveira, Gonçalves, & Branco, 2019). Hoffman and Novak (1996) mentioned the function and consequence of appealing experiences could induce an optimal mental state known as "flow". In smartphone-based online gaming, flow experience is the cyclic playing behaviour and intention (Huang, 2012). The smartphone-based online game users who find their playing experience highly appealing and satisfactory become involved with it and would like to use the device to play online game (Animesh et al., 2011). Lin, Lin, Turel, and Xu (2020) and Kim and Ko (2019) have mentioned that flow experience leads to the intention to use mobile platforms for online games. Thus, the present research proposes the following hypothesis.

H5. Perceived flow has a positive relationship with the intention to use smartphone-based online gaming.

3.6. The moderating role of cognitive involvement

Cognitive involvement involves self-inclusion in a group (Huang, 2012). It is a form of social categorization where people love to see themselves as distinguished from others to create a self-identity in a particular community with a norm, attitude and expectations (Petty & Cacioppo, 1981). Such voluntary inclusion in a particular community affects the attitude and consequences of appealing behaviour (Simon, 2004). This study argues that cognitive involvement is a process that influences user when attitude influences engrossing involvement or flow. Fernandes, Brandao, Lopes, and Quevedo-Silva (2020) mentioned cognitive involvement as a moderator between emotions and satisfaction. Cognitive involvement moderates between customer's ability and creativity (Stolte, Kroesbergen, & Van Luit, 2019). Thus, we may propose the following hypothesis.

H6. Cognitive involvement moderates the relationship between the customer's attitudes and perceived flow.

3.7. The mediating function of customer's engagement

Ou, Chen, Tseng, and Lin (2022) found that attitude and online buying intention are significantly mediated by engagement. A study conducted by Toor, Husnain, and Hussain (2017) found in context of social network marketing attitude and purchase intention are mediated by engagement. Furthermore, customer's engagement is a vital mediator between different factors such as internal and external and purchase behaviour (Piligrimienė, Žukauskaitė, Korzilius, Banytė, & Dovalienė, 2020). The present study argues that engagement plays a mediating role between the attitude and the intention. Thus, we formulate the following hypothesis for further examination.

H7. Engagement plays a mediating role between the customer's attitudes and the intention to use smartphone-based online gaming.

3.8. The mediating function of perceived flow

Flow has become one of the major issues in information technology research (Jung, Perez-Mira, & Wiley-Patton, 2009). Hsu et al. (2012) mentioned that flow is the attribute that increases learning and works as an intermediary between perceived attributes and the intention to use that specific thing. Flow is an agent between attitude and intention to use any technology (Hsu et al., 2012). Kang, Lee, and Namkung (2018) explore the role of flow between attributes of social network sites and intention to use. Chen et al. (2018) tested perceived flow to mediate between different attributes (e.g., perceived usefulness, perceived ease of use) and attention and intention. They have found the relationship significant. Thus, the current research would like to propose the following hypothesis.

H8. Perceived flow plays a mediating role between the customer's attitudes and intention to use smartphone-based online gaming.

Based on the above discussion, theoretical and empirical evidence, we developed a conceptual model (Fig. 1), to test the interrelationships between the constructs.

[Note: Perceived quality of value (PQV), Perceived emotional value (PMV), Perceived usability (PU), Social influence (SOCIN), Psychological well-being (PW), Technology gratification (TG), Customers' attitudes of using smartphone-based online gaming for playing online games (ATT), Cognitive involvement (COGI), Engagement (ENG), Perceived Flow (PF), Intention to use smartphone-based online gaming (IUM)]

4. Methodology

4.1. Research context

The worldwide smartphone-based online gaming industry has become one of the largest in recent times. The COVID-19 pandemic has contributed to the increased trend of smartphone-based online gaming. Due to lockdowns, people have subscribed to different internet packages and engaged in mobile gaming. From the report of Bangladesh Telecommunication Regulatory Commission (BTRC) in January 2020, there were over 99 million internet subscribers in Bangladesh. In 2016, 26.46 million people were online smartphone-based game users, and it is predicted that by 2026, this number will increase to 40.9 million (Bangladesh Telecommunication Regulatory Commission, 2020; Hasan, 2023; The Financial Express, 2020). Popular games in Bangladesh include PUBG, COC, Ludo Star, Call of Duty and Free Fire. The smart phone users are particularly drawn to these games due to their emotional attachment, perceived quality, social influence, usability, and psychological well-being. While the local smartphone-based game manufacturers are trying to introduce more engaging games to the industry, only limited academic research has been conducted in this area. As the industry continues to grow, academic attention is needed for its advancement. This study aims to explore this unexplored area of research via conclusive research design.

4.2. Data collection process

The study aimed to understand how attitudes towards smartphone-based online gaming is formed and how the attitudes lead to the intention of smartphone-based playing games directly, as well as through engagement and flow. To achieve the aim, the study performed face-to-face survey with the target samples which demonstrate the most capable method of conducting a survey (Hibben, Felderer, & Conrad, 2022). The present study applied a convenience sampling method for collecting the data (Zhao, 2020). To test a theory driven graphical and mathematical models in social science researchers frequently applied the convenience sampling method (Peterson & Merunka, 2014). A total of 800 questionnaires were distributed initially and after excluding incomplete questionnaires (33) and straight-lining responses (79) only 688 useable questionnaires were finally used for final data analysis. Responses were collected from different places including higher learning institutions, shopping malls, college campus, street, shopping mall and park intercept using a face-to-face interview process to validate empirically the proposed research model (See Fig. 1). We chose this data collection strategy to collect reliable and high-quality data from the respondents (Rice & Hancock, 2005). We have chosen universities and colleges as the young generations (from 20 to 30 years of age) are accustomed to smartphone-based online games, and different shopping malls and community parks to obtain responses from middle-aged people (from 31 and above 45-year-olds). This process made our data collection easy, fast and economical and helped control the respondents' type. To overcome the limitations of the mall and park intercept data collection process, we applied strategy of a time and location-based systematic approach (Bauer & Strauss, 2016). At first, we observed the class timetable of different colleges and universities and thereafter approached the cluster of students during their break time and at closing time. For the shopping mall intercepts, we observed the peak time of the shopping mall is between 5.30pm and 8.30pm. For the community park intercept, the researchers mostly collected data during the morning and evening time. As during this time frame, most people are visiting parks for jogging, walking and for recreation. Based on all the information, we identified time and location clusters and then approached the respondents. To identify an appropriate sample, we asked them a screening question: What is your favourite online smartphone base online game you have been playing for the last 6 months? Nonetheless, we reviewed all returned questionnaires to verify if the correct candidates had participated in the survey. In addition, every respondent received non-monetary incentives i.e., a BDT100 (USD1) worth prepaid card upon completion of their respective survey instrument.

4.3. Questionnaire design

The study constructs were all adapted from available literature and scales were slightly adjusted to be more consistent with the present research through the process of content validity. The five-point Likert scale was operationalised to estimate all the measures (1 = strongly disagree, 5 = strongly agree). The questionnaire was divided into two sections. The first section covered the respondents' demographic information like age, gender and education and the second part asked questions on customers' attitudes relevant constructs of using smartphones for playing online games (ATT), such as perceived quality of value (PQV), perceived emotional value (PMV), perceived usability (PU), social influence (SOCIN), psychological well-being (PW), technology gratification (TG). Other constructs are cognitive involvement (COGI), engagement (ENG), perceived flow (PF) and intention to use smartphones for online gaming (IUM).

Initially, a pre-test of the survey instrument was conducted with two smartphone-based online gaming players and four academics to provide us constructive feedback in order to the correct wording and sequence of the items of the proposed survey questionnaire. After adjusting their feedback, the present study also used snowballing sampling techniques to distribute the survey question among the 50 respondents initially. In that phase, the respondents not only attempted the scale-oriented items but also provided some important feedback. Based on the feedback, we adjusted the survey instruments again in regard to the wording of the scales. Finally, an online survey was again conducted on another 50 respondents to collect the data for the test survey. At this point, Cronbach's alpha scores were checked for reliability and the questionnaire. The results generate the value of Cronbach's alpha is above 0.70 in both the size of the respondents. Thereafter the questionnaire was finalised. Respondents participating in the formal research survey were given an information page that briefly highlighted the aim of the study along with respondent consent. The questionnaire contained 33 items, were distributed under all the study variables and respondents were given

sufficient time to complete the survey. The collected final data were analysed through statistical procedures to confirm the reliability and validity. Among the online smartphone base games, respondents mostly like to play PUBG (17.15%) followed by LUDO (16.13%). The detailed profile of the respondents is presented in Table 1.

4.4. Measurements

In this study we formed the customers' "attitudes" of using smartphone-based online games (ATT) construct by combining six (6) variables: perceived performance quality of value (PQV-3 items), perceived emotional value (PMV-5 items), perceived usability (PU-3 items), social influence (SOCIN-3 items), psychological well-being (PW -4 items) and technology gratification (TG-3 items). The study adapted items for perceived performance quality of value (PQV) and perceived emotional value (PMV) from the Hsiao and Chen (2016) and Zhao and Lu (2012a) studies; perceived usability (PU) from Oghuma et al. (2016), social influence (SOCIN) from Ramírez-Correa et al. (2019), psychological well-being (PW) adapted from Diener, Emmons, Larsen, and Griffin (1985) research, and technology gratification (TG) adapted from Jang and Liu (2020) research. Moreover, the intention to use smartphone-based online gaming (IUM) was adapted from Hsiao and Chen (2016) and measured by 3 items, 3 items of cognitive involvement (COGI) and 3 items of the construct perceived flow (PF) were adapted from Huang (2012), and 3 items of engagement (ENG) were adapted from de Canio, Fuentes-Blasco, and Martinelli (2021). The measurement items of the research constructs are presented in **Appendix 1**.

4.5. Test common method bias (CMB)

As data were collected from a single source, the issue of CMB always concern for cross-sectional study design (Jordan & Troth, 2020). CMB creates a problem related to validity and structural relationship (Sharma et al., 2021). To minimize the risk related to CMB, the present study followed the suggestion addressed by Podsakoff et al.'s (2003). Under procedural measures, we operationalised to measure the study variables with a standard response format of a five-point Likert scale (Rahman, Abdel Fattah, Hussain, & Hossain, 2021). During the data collection period the researchers assured the respondents about the protection of their privacy and personal information. Meanwhile they were also informed that all of their identities and their individual responses will be kept anonymous. In the statistical process, we performed Harman's (1967) single-factor examination with the collected data set via exploratory factor analysis (EFA). The outcome from the EFA analysis highlight that only 22.50% explained by a single factor, which is less than the threshold value of 50.00%. Therefore, the collected data set has no serious concern of CMB.

Table 1
Respondents demographic profile (n = 688).

Variable/Dimensions	Frequencies	Percentage
Respondents gender distribution		
Male	387	56.25%
Female	301	43.75%
Age distribution		
20–25	258	37.5%
26–31	262	38.08%
32–37	101	14.68%
38–43	54	7.84%
44–Above	13	1.88%
Monthly Income		
Below 10,000	196	28.48%
10,001–20,000	118	17.15%
20,001–30,000	131	19.04%
30,001–40,000	95	13.80%
40,001–50,000	108	15.69%
50,001 – Above	40	5.81%
Education Level		
College (Higher Secondary Certificate)	219	31.83%
Bachelor's	233	33.86%
Master's/MBA/MSC/MPhil	151	21.94%
Diploma	85	12.35%
Online Mobile Games Experience		
Less than one year	48	6.97%
One to two years	267	38.80%
Three to four years	229	33.28%
Five to six years	106	15.40%
More than six years	38	5.52%
Most playing games		
PUBG	118	17.15%
Mobile Racing	98	14.24%
Mobile Shooting	102	14.82%
FIFA, Mobile Legends	79	11.48%
Mobile LUDO	111	16.13%
Mobile Puzzle	86	12.5%
Call of Duty	94	13.66%

4.6. Nonresponse bias

Between January 2022 to April 2022, the researchers collected data from colleges, universities, shopping malls and parks located in different places of the major cities in Bangladesh. Questionnaires were distributed in two phases. We made comparisons of the returned questionnaires from the first 1.5 months and the last 1.5 months. At the end of the first phase of data collection (Jan 2, 2022), we collected only 333 respondents' data (48.4% response rate), and at the end of the second phase (April 30, 2022), we managed to receive 355 data (51.6% response rate). Afterwards, we performed an independent-sample *t*-test (Hudson, Seah, Hite, & Haab, 2004; Smironva, Kiatkawsin, Lee, Kim, & Lee, 2020). These results showed no such significant differences exist between the two waves of data set. Thus, the collected data had no problem of non-response bias.

4.7. Data analysis methods

The proposed theoretical model in Fig. 1 is identified with ten latent constructs, each of them operationalised by a set of variables. The present study applied PLS-SEM data analysis tool to ensure the robustness of structural model to depict causal sequences and measuring higher-order constructs (Duarte & Amaro, 2018; Ndayizigamiye, Kante, & Shingwenyana, 2020; Sarstedt et al., 2020). As suggested, we performed a two-stage data analysis process under the paradigm of PLS-SEM, for instance testing of the measurement model and the structural model (Hair, Risher, Sarstedt, & Ringle, 2019). Bootstrapping (resampling = 5000) was also performed to examine the path coefficient and factor loading (Streukens & Leroi-Werelds, 2016).

In this study, the attitude of using smartphone for online gaming was used as a formative construct, in which the second-order construct is attitude (ATT), whereas the first-order construct has a reflective measurement (perceived quality of value-PQV, perceived emotional value-PMV, perceived usability-PU, social influence-SOCIN, psychological well-being-PW, technology gratification-TG), is indicate to type II models (Becker, Klein, & Wetzels, 2012). These types of higher-order modelling may analysis through PLS-SEM for achieving the path model in more materialistic, and through the PLS-SEM process we could scientifically express the formative variables such as "attitude of using the smartphone-based online gaming" constructively (Hair, Hult, Ringle, & Sarstedt, 2017).

In the second stage of data analysis, we employed ANN analysis for predicting the hypothesized relationships (Chong, 2013). Conventional research approaches like SEM simply analyze the linear relationships and help in oversimplifying the complex relationship (Chong, 2013). By adopting neural network analysis, we could be able to solve complex modelling procedures that embraced with linear and non-linear relationships between predictors and the outcome variable (Chan & Chong, 2012; Liébana-Cabanillas, Marinković, & Kalinin, 2017). Furthermore, ANNs are more robust than linear models and can deliver

higher prediction accuracy (Tan, Ooi, Leong, & Lin, 2014). Thus, we utilized SEM-ANN together to understand and identify the predictability of our proposed model.

5. Results

5.1. Measurement model testing

5.1.1. Test of reliability and validity

The results from the measurement model analysis revealed that all the outer loadings are above 0.70 and achieve the minimum threshold of respective construct (see Table 2). The results also shows that all the constructs individual composite reliability is all above 0.70 with sufficient amount of Cronbach alpha (α)>0.70 reflect a high degree of data internal consistency (Hair et al. 2017). The present research also examined the individual item's loading and corresponding construct's average variance extracted (AVE) to justify convergent validity of the measurement model (See Table 2). The results from the measurement model analysis shows that all the values of corresponding variable's AVE are higher than 0.50 confirm the convergent validity (Franke & Sarstedt, 2019). In addition, the values of the item's loadings are above 0.70 also confirm the convergent validity (Fornell & Larcker, 1981) (See Table 2). Finally, the discriminant validity of the measurement model was tested by following the criterial proposed by Fornell–Larcker. The results shows that all the values of the square roots of the AVEs are more than their respective correlation coefficients meet the criteria of the discriminant validity of our proposed measurement model (see Table 3). Furthermore, Hetrotrait-Monotrait ratio of correlations (HTMT) was also examined to cross-check the discriminant validity Ali, Rasoolimanesh, Sarstedt, Ringle, and Ryu (2018) by following HTMT criterion proposed by Henseler, Ringle, and Sarstedt (2015). According to Henseler et al. (2015) HTMT ratio must be less than 1.00. The results from the analysis confirmed that all the constructs met the requirement of discriminant validity (see Table 4).

Table 2
Reliability and validity of the measurement model.

Construct	Items	SL	α	CR	AVE	VIF
Customers' attitudes of using smartphone for playing online games (ATT)						
Perceived Performance Quality of Value (PQV)	PQV1	0.836	0.790	0.873	0.698	1.325
	PQV2	0.796				1.125
	PQV3	0.873				1.523
Perceived Emotional Value (PMV)	PMV1	0.748	0.790	0.856	0.543	1.474
	PMV2	0.703				1.390
	PMV3	0.767				1.580
	PMV4	0.701				1.469
	PMV5	0.763				1.632
Perceived Usability (PU)	PU1	0.734	0.748	0.841	0.570	1.418
	PU2	0.799				1.645
	PU3	0.742				1.518
	PU4	0.744				1.404
Social Influence (SOCIN)	SOCIN1	0.871	0.837	0.902	0.754	2.019
	SOCIN2	0.884				2.171
	SOCIN3	0.850				1.790
Psychological Well-being (PW)	PW1	0.755	0.806	0.873	0.632	1.498
	PW2	0.827				1.758
	PW3	0.825				1.807
	PW4	0.771				1.575
Technology Gratification (TG)	TG1	0.831	0.754	0.843	0.642	1.094
	TG2	0.775				1.094
	TG3	0.798				1.087
Perceived Flow (PF)	PF1	0.797	0.796	0.840	0.639	1.215
	PF2	0.883				1.215
	PF3	0.709				1.219
Engagement (ENG)	ENG1	0.835	0.793	0.804	0.581	1.121
	ENG2	0.809				1.403
	ENG3	0.828				1.439
Cognitive involvement (COGI)	COGI1	0.864	0.766	0.866	0.683	1.981
	COGI2	0.848				1.887
	COGI3	0.764				1.316
Intention to use smartphone for online gaming (IUM)	IUM1	0.747	0.711	0.794	0.562	1.292
	IUM2	0.777				1.320
	IUM3	0.724				1.130

5.1.2. Assessment of the formative construct

The findings of the higher-order construct "attitude of using smartphone-based online gaming" is presented in Table 5. The study estimated the attitude consists of 6 first-order reflective constructs with 22 valid items (See Appendix 1 and Fig. 1). The present study estimated the weights of items of the higher-order constructs in terms of their significance at $p < 0.05$. The results from the analysis explore that all the items under higher-order constructs are significant at $p < 0.05$ level. The findings from the analysis also show a lack of evidence of collinearity as all the values of variance inflation factor (VIF) under each item were less than 5.00 (See Table 2). The results of the explained variance of the second-order constructs are shown in Table 5 where all the paths are significant at $p < 0.05$ on the higher-order level. The results also revealed that among the six first-order constructs perceived usability (PU) has the highest explanatory power $\beta = 0.316$, followed by technology gratification (TG) explains $\beta = 0.241$, perceived performance quality of value (PQV) explains $\beta = 0.235$ (See Table 5).

5.2. Structural model analysis

After assessment of the measurement model, we applied PLS-SEM to test the structural model (Hair et al., 2019). In this process, firstly we examined the model's predictive quality via adjusted R^2 followed by predictive relevance with the values of Q^2 (Ringle, Sarstedt, Mitchell, & Gudergan, 2020). The results of R^2 of the endogenous latent variables are shown in Table 6. The R^2 coefficient of the construct attitude of using smartphone-based online gaming was 0.988 (i.e., attitude towards playing smartphone-based online mobile games as a predictor explained 98.08% of the variance in intention to use smartphone-based online gaming). Similarly, the R^2 value of intention to use smartphone-based online gaming is 0.418 which explains 41.08% of the predictive model.

Thus, the attitude toward using smartphone-based online gaming shows a considerable amount of explanatory power and the intention to use smartphone-based for online gaming also shows a sufficient amount explanatory power in defining the variance (Hair et al., 2019). Afterwards, we performed predictive relevance (Q^2) to endogenous constructs that have reflective measurements (Weedige, Ouyang, Gao, & Liu, 2019). The results from the analysis explore that all the respective Q^2 values are above zero (See Table 6) justify the model's reflects satisfactory predictive relevance. Thus, the study found intention to use smartphone-based online gaming = 0.418 and attitude = 0.988 indicating a medium predictive relevance.

5.2.1. Hypotheses testing

The result of the structural model analysis is shown in Table 7. The results support all the direct and indirect relationship which are proposed in this research. Thus, all the hypotheses are found supported. The results also show a significant relationship between the attitude of using a smartphone-based online gaming and intention to use the smartphone-based online gaming ($\beta = 0.366$, $t = 7.004$, $p < 0.000$), the attitude of using a smartphone for online gaming and engagement ($\beta = 0.489$, $t = 14.111$, $p < 0.000$), engagement and intention to use smartphone-based online gaming ($\beta = 0.162$, $t = 4.284$, $p < 0.000$), the attitude of using a smartphone for online gaming and perceived flow ($\beta = 0.612$, $t = 23.632$, $p < 0.000$), perceived flow and intention to use a smartphone-based for online gaming ($\beta = 0.243$, $t = 5.340$, $p < 0.000$). Therefore, all the hypothesized direct relationships are significant and positive (See Table 7 and Fig. 2).

5.2.2. Moderation analysis

The study employed cognitive involvement as a moderator in this study. The result of the moderation analysis is given in Table 7. The results indicate that cognitive involvement positively moderates the

Table 3
Fornell-Larcker criterion.

Construct Name	COGI	ENG	IUM	PMV	PF	PQV	PU	SOCIN	PW	TG
COGI	0.827									
ENG	0.367	0.762								
IUM	0.418	0.420	0.750							
PMV	0.549	0.347	0.466	0.737						
PF	0.513	0.390	0.526	0.500	0.799					
PQV	0.492	0.317	0.400	0.358	0.322	0.816				
PU	0.530	0.388	0.481	0.606	0.531	0.389	0.755			
SOCIN	0.576	0.351	0.475	0.688	0.476	0.411	0.562	0.868		
PW	0.609	0.378	0.450	0.669	0.489	0.419	0.545	0.697	0.795	
TG	0.391	0.403	0.407	0.516	0.454	0.270	0.626	0.484	0.520	0.804

[N.B. Perceived quality of value (PQV), Perceived emotional value (PMV), Perceived usability (PU), Social influence (SOCIN), Psychological well-being (PW), Technology gratification (TG), Cognitive involvement (COGI), Engagement (ENG), Perceived flow (PF), Intention to use smartphone-based online gaming (IUM)].

Table 4
Hetrotrait-Monotrait ratio (HTMT).

Construct Name	COGI	ENG	IUM	PMV	PF	PQV	PU	SOCIN	PW	TG
COGI										
ENG	0.523									
IUM	0.609	0.672								
PMV	0.705	0.489	0.661							
PF	0.757	0.638	0.703	0.715						
PQV	0.798	0.560	0.717	0.568	0.585					
PU	0.700	0.566	0.705	0.785	0.781	0.635				
SOCIN	0.719	0.479	0.662	0.842	0.666	0.638	0.709			
PW	0.772	0.523	0.635	0.839	0.703	0.658	0.700	0.651		
TG	0.660	0.739	0.766	0.710	0.706	0.570	0.666	0.782	0.796	

[N.B. Perceived quality of value (PQV), Perceived emotional value (PMV), Perceived usability (PU), Social influence (SOCIN), Psychological well-being (PW), Technology gratification (TG), Cognitive involvement (COGI), Engagement (ENG), Perceived flow (PF), Intention to use smartphone-based online gaming (IUM)].

Table 5
Assessment of the higher-order model.

Second-order formative construct	Relationship with first-order dimensions	β	T Statistics	P Values	95% BI-CI	
					Lower	Upper
ATT	Perceived emotional value (PMV)	0.269	3.652	0.008	0.047	0.299
	Perceived performance quality of value (PQV)	0.235	4.571	0.000	0.138	0.340
	Perceived usability (PU)	0.316	4.906	0.000	0.196	0.450
	Social influence (SOCIN)	0.257	3.122	0.034	0.014	0.303
	Psychological well-being	0.272	3.737	0.006	0.047	0.293
	Technology gratification (TG)	0.241	3.772	0.000	0.110	0.360

[Note: Customers' attitudes of using smartphone-based platforms for playing online games (ATT)].

Table 6
Result of adjusted R^2 and $Q.^2$.

Construct	R^2	Q^2
Customers' attitudes of using smartphone platforms for playing online games (ATT)	0.988	0.37
Engagement (ENG)	0.238	0.13
Intention to use smartphone-based online gaming (IUM)	0.418	0.23
Perceived flow (PF)	0.374	0.25

relationship between the attitude of using a smartphone-based online gaming and the intention to use a smartphone-based online gaming ($\beta = 0.121$, $t = 4.764$, $p < 0.000$).

5.2.3. Mediation analysis

Table 7 depicts the mediation analysis. The indirect effect test result shows that customer engagement positively and significantly mediates the relationship between the attitude of using smartphones for online gaming and the intention to use mobile platforms for online gaming ($\beta = 0.110$, $t = 4.580$, $p < 0.000$). We investigated the perceived flow as a mediator in the same relationship. We have found that perceived flow significantly mediates the relationship between attitude and intention to use smartphones for online gaming ($\beta = 0.149$, $t = 5.131$, $p < 0.000$).

5.3. Analysis of artificial neural networks (ANN)

Due to the probability of non-linear relationships between the independent and dependent variables, the study conducted further analysis of the data by applying ANNs to explore the normalized importance of the significant influencing constructs toward the outcome variable (Leong, Hew, Ooi, & Wei, 2020; Mok & Kwong, 2002; Shahzad, Xiu, Khan, & Shahbaz, 2020). The analysis may allow the research findings to complement SEM-PLS and ANN can capture the non-linearity of relationships (Hew, Leong, Ooi, & Chong, 2016; Sternad Zabukovšek, Kalinic, Bobek, & Tominc, 2019; Vizcaíno-González, Pineiro-Chousa, & Sáinz-González, 2017).

The study validates the results of ANN by conducting the accuracy measurement via root mean square error (RMSE) (Liebana-Cabanillas et al., 2017; Liébana-Cabanillas, Marinkovic, de Luna, & Kalinic, 2018) (see Table 8). The present study applied seventy percent of data points for training and the lasting thirty percent for testing groups (Liebana--Cabanillas et al., 2017). The study applied one in the ANN process where the attitude of using a smartphone for online gaming (ATT), engagement (ENG) and perceived flow (PF) was operationalised in the ANN model as

Table 7
Assessment of the structural model (Results of direct, indirect and Moderation test).

	Beta	M	SD	T Statistics	P Values	Decision	95% BI-CI	
							Lower	Upper
Direct Relationships								
H1) ATT - > IUM	0.366	0.377	0.052	7.004	0.00	Supported	0.251	0.458
H2) ATT - > ENG	0.489	0.498	0.035	14.111	0.00	Supported	0.406	0.546
H3) ENG - > IUM	0.162	0.158	0.038	4.284	0.00	Supported	0.093	0.241
H4) ATT - > PF	0.612	0.621	0.026	23.632	0.00	Supported	0.55	0.654
H5) PF - > IUM	0.243	0.237	0.046	5.34	0.00	Supported	0.161	0.336
Moderation Relationship								
H6) COGI* ATT - > IUM	0.121	0.119	0.025	4.764	0.00	Supported	0.069	0.168
Mediation Relationship								
H7) ATT - > ENG - > IUM	0.11	0.179	0.02	4.58	0.00	Supported	0.041	0.119
H8) ATT - > PF - > IUM	0.149	0.147	0.029	5.131	0.00	Supported	0.091	0.203

Note: Customers' attitudes of using smartphone for playing online games (ATT), Cognitive involvement (COGI), Engagement (ENG), Perceived flow (PF), Intention to use smartphone-based online gaming (IUM).

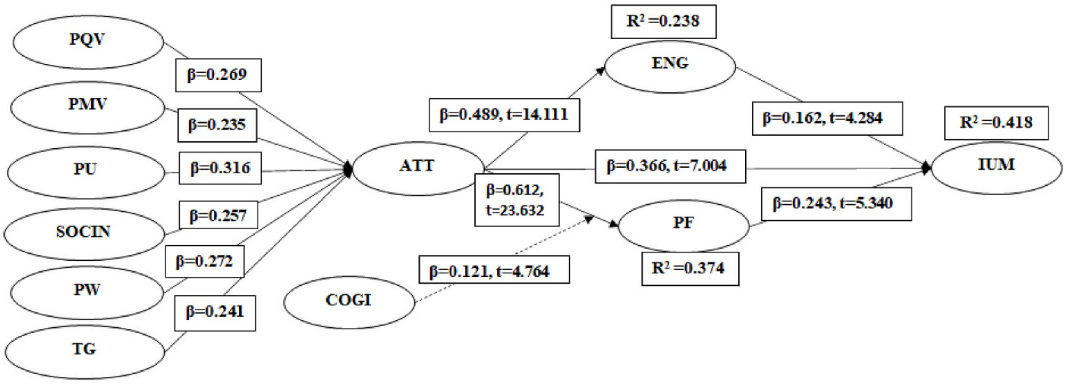

Fig. 2. Results of Structural model [Notes: Perceived quality of value (PQV), Perceived emotional value (PMV), Perceived usability (PU), Social influence (SOCIN), Psychological well-being (PW), Technology gratification (TG), Customers' attitudes of using smartphone-based platforms for playing online games (ATT), Cognitive involvement (COGI), Engagement (ENG), Perceived flow (PF), Intention to use smartphone-based platforms for online gaming (IUM)].

Table 8
Neural network validation result.

ANN	SSE (Training) (IUM)	SSE (Testing) (IUM)	RMSE (Training) (IUM)	RMSE (Testing) (IUM)	RMSE (TRAINING) - RMSE (Testing) (IUM)	SSTR	SSTS	n
ANN1	0.499	0.104	0.033	0.022	0.011	472	216	688
ANN 2	0.346	0.119	0.027	0.023	0.004	471	217	688
ANN 3	0.361	0.127	0.027	0.025	0.002	483	205	688
ANN 4	0.368	0.186	0.028	0.029	0.001	470	218	688
ANN 5	0.438	0.104	0.030	0.023	0.007	487	201	688
ANN 6	0.357	0.125	0.028	0.024	0.003	472	216	688
ANN 7	0.342	0.113	0.027	0.023	0.004	475	213	688
ANN 8	0.335	0.185	0.027	0.029	0.003	471	217	688
ANN 9	0.306	0.169	0.026	0.028	0.002	468	208	688
ANN10	0.328	0.178	0.026	0.028	0.002	468	208	688
SUM	3.68	1.41	**0.279**	**0.254**	**0.039**			
Mean	**0.368**	**0.141**	**0.028**	**0.025**	**0.004**			
SD	**0.0547**	**0.0342**	**0.002**	**0.003**	**0.003**			

Note: Intention to use smartphone-based online gaming (IUM), SSE=Sum square of errors, RMSE = Root mean square of errors, SSTR= Sample size training, SSTS= Sample size testing, ANN= Artificial neural network, n = sample size.

the input layer (neurons), intention to use smartphone-based for online gaming (IUM) was applied as outcome layer (see Fig. 3). The results from the ANN modelling produced a variation of RMSE, which reflects the overall error in training and testing (see Table 9 and Fig. 4). The average difference between RMSE values in the training and testing model is least (mean = 0.0044, sd = 0.003), which rationalise that we can proceed with a sensitivity analysis (Oparaji, Sheu, Bankhead, Austin, & Patelli, 2017; Tan et al., 2014).

The present study conducted a sensitivity analysis in our proposed model to determine the variations in the intention to use smartphone-based online gaming (IUM - outcome variable) by the nature of changes in the independent variables, such as the attitude towards using a smartphone for online gaming (ATT), engagement (ENG) and perceived flow (PF) associated with it. The results from the sensitivity analysis revealed that in the ANN model, the ATT is the most influential independent variable (IV), with the highest relative importance for predicting intention to use smartphone-based online gaming (IUM - dependent variable). This is followed by perceived flow (PF), with a relative importance of 32.56%. The ANN analysis results conclude that ATT and PF are the most influential variables in predicting intention to

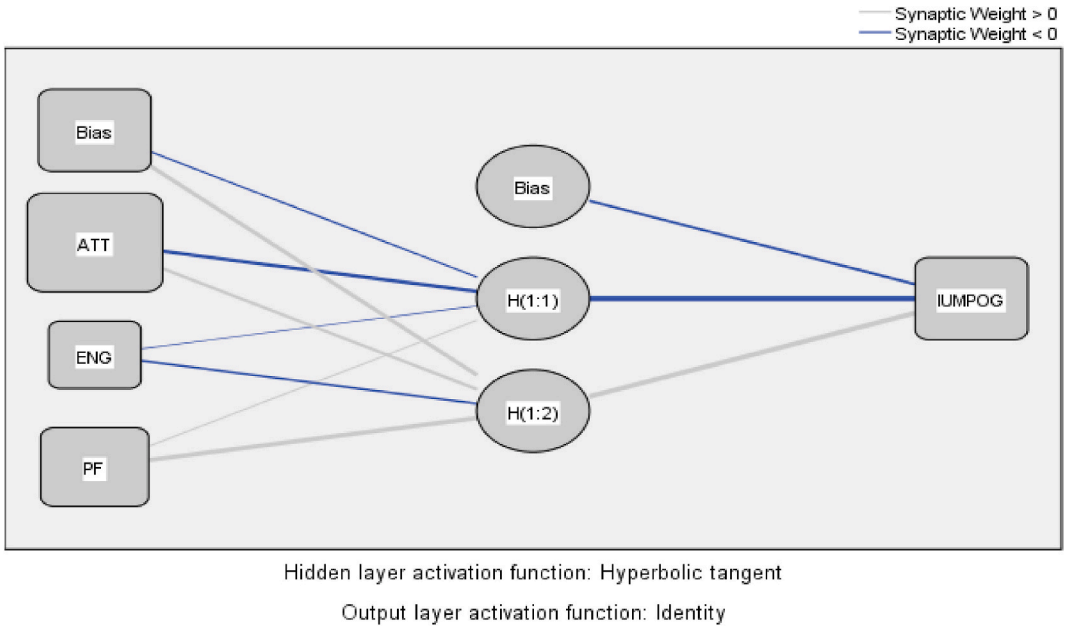

Fig. 3. Artificial neural network architecture.

Table 9
Importance of constructs.

Network	ATT	ENG	PF
ANN1	0.399	0.275	0.326
ANN 2	0.430	0.229	0.341
ANN 3	0.417	0.257	0.326
ANN 4	0.492	0.189	0.319
ANN 5	0.445	0.199	0.356
ANN 6	0.435	0.249	0.316
ANN 7	0.465	0.247	0.288
ANN 8	0.580	0.190	0.230
ANN 9	0.561	0.209	0.230
ANN10	0.479	0.205	0.316
Average Importance	0.470	0.225	0.305
Normalized variable Importance: Relative importance	100%	0	32.56%

[Note: Customers' attitudes of using smartphone for playing online games (ATT), Cognitive involvement (COGI), Engagement (ENG), Perceived flow (PF)].

use smartphone-based online gaming (see Table 9).

6. Discussion

The study primarily develops and empirically validates a psychometrically robust model of the attitude towards using smartphones for online gaming and its proximal antecedents. Leveraging from the literature and statistical analysis, the study confirms that customers' attitudes towards using smartphones for online gaming are conceptualised as individual constructs which can be assessed and conceptualized by six antecedents of "attitude towards using mobile phone for online gaming": perceived emotional value, perceived quality value, social influence, technology gratification, perceived usability and psychological well-being. Our findings also indicate that all are significant drivers explaining the attitude toward using smartphones for online gaming. The results also reveal that perceived usability emerges as the most vital antecedent of customers' attitudes towards using smartphones for online gaming. This highlights the importance of providing customers with the introduction of basic game concepts to optimise learnability, agile operation, error prevention and intelligent setting (Agarwal & Venkatesh, 2002; Nielsen & Molich, 1990).

The present research applied existing theory and multivariate data analysis to advance the understanding and development of the conceptualisation and measurement of the attitude toward using smartphones for online gaming as a formative construct. More precisely, the six proximal antecedents explain 89.30% of the variation in the overall attitude towards using smartphones for online gaming constructs. This reflects that each antecedent contributes to forming a customer's attitude towards using a smartphone for online gaming.

This study aimed to understand and predict customers' intentions to

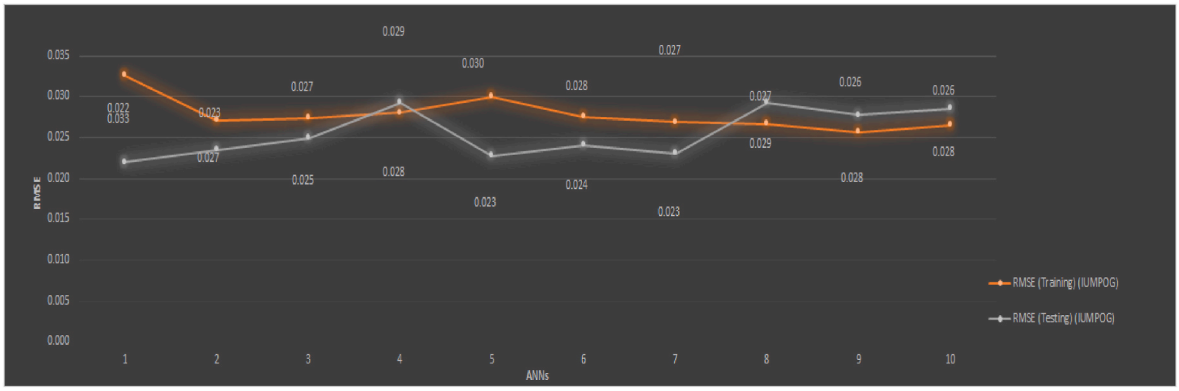

Fig. 4. Distribution of root mean square of errors.

use smartphone-based online gaming by examining the relationship between attitude, engagement and perceived flow. The study also analysed the moderation effect of cognitive involvement in the relationship between attitude and perceived flow.

To understand and predict customers' intentions to use smartphones for online gaming, the researchers applied dual-staged analytical approaches based on *PLS-SEM-ANN* modelling. The results from the PLS-SEM analysis indicate the direct effect of the attitude towards using smartphones for online gaming on intention to use smartphones for online gaming, customers' engagement and perceived flow. This confirms that H1, H2 and H4 are significantly positive. Customers' engagement in smartphone platforms for online gaming has a positive relationship with the customer's intention to use smartphone-based online gaming (H3). Hence, the perceived flow positively influences the intention to use smartphone-based online games (H5). The results suggest that the attitude has a significant positive effect on the intention to use smartphone-based online gaming, engagement and perceived flow, with the highest effect being on perceived flow for online gaming.

These findings extend the marketing literature in the context of mobile gaming scope to understand the relative effect of the attitude toward using smartphones for online gaming on the intention to use smartphones for online gaming, engagement and perceived flow. Meanwhile, the analysis also indicates that perceived flow has the strongest influence on the intention to use smartphone platforms for online gaming, followed by engagement. These insights strengthen the rigour of the dynamics of customers' attitudes which has also been found in prior research (Hsu et al., 2012; Huang, Backman, & Backman, 2010; Kim, Kim, & Wachter, 2013; Yang et al., 2017). The results of the current study are consistent with those findings.

Furthermore, the study tested the indirect effect of engagement and perceived flow on the relationship between the attitude and intention towards using smartphone-based online gaming. The results confirmed the existence of a mediating effect of engagement and perceived flow between the attitude and intention to use are significant (H7 and H8). The mediation analysis results showed that, as opposed to a direct relationship on the outcome variable, the major effect of the customer's attitude on intention to use a smartphone for online gaming was transmitted via engagement and perceived flow. In fact, among the two mediation effects, the perceived flow has the highest mediating role in between attitude and intention followed by the engagement construct. Furthermore, the study attempted to examine the moderating effect of customers' cognitive involvement in-between customer's attitudes and perceived flow. The results suggest that customers' cognitive involvement plays a key part in these issues (H8). The findings suggest that the effect of the attitude of using a smartphone would be enhanced if the online gaming mobile platform is somehow cognitively involved with the customer. The findings suggest that cognitive involvement has a strong moderating effect on the perceived flow, which is also evident from previous research (Novak, Hoffman, & Yung, 2000). We expected that customers who were more cognitively involved with online gaming on their respective smartphones would have more positive experiences with the games they play (Wang, Wang, & Farn, 2009).

Finally, the study conducted an ANN modelling analysis to clearly understand the importance of each precedence regarding customers' intentions to use smartphone-based online gaming. The results from the ANN analysis revealed that attitude towards using smartphones for online gaming is the most reliable indicator of the customer's intention to use a smartphone for online gaming, followed by perceived flow. As revealed from the sensitivity analysis on the order of importance, the attitude towards using smartphones for online gaming and perceived flow are important predictors in the ten networks analysis. At the same time, customer engagement does not predict whether customers intend to use smartphones for online gaming or not. This research applied this ANN method to demonstrate non-compensatory decision-making processes in both linear and non-linear processes (Chan & Chong, 2012; Chong, 2013).

6.1. Implications for theory

The present study extended previous online gaming research by ascertaining customers' intention to use smartphones for online gaming by applying the perceived flow theory (Huang et al., 2018; Liao, Cheng, & Teng, 2019; Ari et al., 2020). This research identifies customers' cognitive involvement as a novel moderator that can apply the formulation of customers' perceived flow experience in playing online games on their respective smartphones.

In light of the novel integration of perceived flow theory, the present study employed customers' cognitive involvement as a moderator between customers' attitudes toward using smartphone-based online gaming for playing online games and perceived flow, which explains the understanding of how customers feel when they have mostly enjoyed themselves in the playing of smartphone-based online gaming (Csikszentmihalyi & LeFevre, 1989). Our results show that the customer's cognitive influence affects attitude and perceived flow. Customers' perceived flow towards smartphone-based online gaming will be enhanced by the effect of attitude when their cognitive involvement is high. Customer's cognitive involvement plays a significant role in leveraging the customers' attitudes toward using smartphone-based online gaming for playing online games. Thus, the findings from the present research show a new insight into the customer's cognitive involvement concept in smartphone base online gaming studies by linking the concept of perceived flow theory (Csikzentmihalyi, 1990; Pace, 2003), which develops our knowledge in a fine-grained view of the dynamics of moderating effects of customers' cognitive involvement. In smartphone base gaming setting, customers' perceived flow occurs when they have a high degree of influence by their attitude toward using mobile phone platforms for playing online games which are comprised of customer's perceived quality of value, emotional value, usability, social influence, psychological well-being, and technology gratification. Meanwhile, the perceived flow of a particular customer may enhance on smartphone-based games when an individual is in a concentrated state of cognitive involvement in selecting that specific game. Above all, the present study also explores that perceived flow is a valuable construct in explaining individual customers' intention to use a smartphone based online gaming (Csikszentmihalyi & Csikszentmihalyi, 1988; Ilsever, Cyr, & Parent, 2007).

The application of the moderator may allow future researchers to understand and predict the formulation of the flow experience in gaming literature. In addition, factors such as customers' attitude, perceived flow, engagement and cognitive involvement are included for online gaming, which theoretically and empirically supports and extends the understanding of the customers' intentions to use the smartphone. The present research also identified, tested, and validated the "attitude of using smartphones for online gaming" as a reflective formative construct that includes perceived emotional value, quality value, social influence, technology gratification, perceived usability and psychological well-being. Hence, this contributes to the smartphone gaming literature by explaining the inter-relationship between customers' attitudes sub-dimensions in the scope of smartphones for online gaming, which had not yet been studied as a higher-order construct in the context of smartphone online gaming.

Scott and Walczak (2009) recommend applying the multi-analytic approach to improve the validity of the findings. For example, the PLS-SEM analysis's statistical significance results complemented the neural network was an appropriate approach to analysing a regression-based conceptual model (Garson, 1998; Ragin, 2009). Hence, this study adopted the dual-stage analytical approach to perform as a new perspective, unique reflection, and a good reference for future smartphone-based gaming studies. Finally, this study was conducted in Bangladesh, one of the world's largest smartphone-based online gaming markets. The findings from this study will surely assist the game developers who are planning to enter the largest gaming market where they can formulate appropriate marketing strategies based on the research results.

6.2. Managerial implications

The findings of this research provide the managers of the gaming industry with a more comprehensive understanding of customers by understanding their attitude, perceived flow, engagement and cognitive involvement that incorporate the aspect of customers' intentions to use smartphone-based online gaming. In essence, the study has several practical implications that can assist the practitioners in developing marketing strategies for their respective online games, which can be played on mobile phones. This research proposed six dimensions of customer attitude.

The customer's perceived usability and technological gratification contribute to constructing the "attitude of using smartphones for online gaming", followed by the perceived performance quality of value, psychological well-being, and perceived emotional value and social interaction. Therefore, if marketers need to improve their attitude towards using smartphones for online gaming, they should think about the functional issues of the online game, which can be used appropriately by the users to achieve satisfaction in a specified context of online games that may play on smartphones. Since customers' interface in playing online games by using smartphones was found to have a significant impact on their satisfaction, it is recommended that game developers apply the best online platform to designing and developing an attractive interface and user-friendly on the smartphone. To differentiate the mobile games among the customers, the developers must invest their resources in an in-depth understanding of customers' attitudes regarding their perceived emotions and enjoyment by delivering unique functional value. The findings also suggest that game developers should further improve communication functionalities in their gaming platform to enhance the ability of mobile games to communicate and interact with others with a better and quicker connection.

The results of the moderation analysis suggest that cognitive involvement plays a vital role in enhancing the effect of the attitude of using smartphones for online gaming on perceived flow. This implies that it is more likely that customer involvement should be boosted by the game developers to achieve a more significant relationship with customers with online smartphone games. This study also adds new insights on an under-researched phenomenon in gaming literature by incorporating key mediating variables that help the managers to understand how perceived flow, customer engagement and intention to use smartphones for online gaming are influenced by customers' attitudes towards using a smartphone for online gaming. These findings ultimately allow the game developers to develop strategies to effectively understand the customers' attitudes that promote online games in their respective consumer markets, thus optimizing the impact of customers' intentions to use smartphone-based online gaming.

The identified results from ANN provide a recommendation to the managers and game developers regarding the strategic orientation to improve their online games since the optimization of customers' intentions to use smartphone-based online gaming should take into consideration customers' attitudes and perceived flow based on their online gameplay. Indeed, online mobile game developers should apply better strategies to address customers' needs and understand their social and psychological well-being and emotions that influence engagement and perceived flow formulation. Also, since the presence of customers' attitudes towards using smartphones for online gaming is a significant sufficient condition, game developers may consider specific characteristics of their games that can positively influence the customers' attitudes.

Finally, the results from the ANN analysis have also revealed that advertising values customers' attitudes towards using smartphones for online gaming are the most important predictor of customers' intentions to use smartphone-based online gaming. Essentially, the attitude towards using smartphones for online gaming depends on understanding perceived usability, technology gratification, perceived quality value, perceived emotional value, psychological well-being and social influence. These highlights justify the need for sophisticated online mobile game customization by placing customer attitudes at the centre of developing the marketing strategy.

6.3. Study limitations and future research

The present study has a few limitations that require further examination. Firstly, cross-sectional data was collected from a developing country which confines the generalizability of the research findings. Therefore, a future study requires collecting data from multiple countries and examining comparative results on customers' intentions to use smartphones base online gaming. Secondly, the present study only adopted multivariate data analysis by applying dual-stage data analysis by using quantitative cross-sectional data. Future research is also recommended to be conducted via a longitudinal research approach, which allows the exploration of customers' intentions to use smartphone-based online games over time. Finally, the present study adopted a convenience sampling process to collect data. Based on this limitation, we recommend that future research may be examining the study variables by collecting a large, national sample of respondents by using a systematic sampling strategy.

Author statement

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chb.2023.108083.

References

Abbas, M., Gao, Y., & Shah, S. S. H. (2018). CSR and customer outcomes: The mediating role of customer engagement. *Sustainability, 10*(11), 42–43.

Abbasi, G. A., Goh, Y. N., Iranmanesh, M., & Liebana-Cabanillas, F. (2023). Determinants of continuous intention to use retail apps: A hybrid PLS-ANN approach. *Journal of Marketing Theory and Practice*, 1–22.

Abbasi, A. Z., Rehman, U., Hussain, A., Ting, D. H., & Islam, J. U. (2021). The impact of advertising value of in-game pop-up ads in online gaming on gamers' inspiration: An empirical investigation. *Telematics and Informatics, 62*, 1016–1030.

Agarwal, R., & Venkatesh, V. (2002). Assessing a firm's web presence: A heuristic evaluation procedure for the measurement of usability. *Information Systems Research, 13*(2), 168–186.

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin, 84*(5), 888.

Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M., & Ryu, K. (2018). An assessment of the use of partial least squares structural equation modelling (PLS-SEM) in hospitality research. *International Journal of Contemporary Hospitality Management, 30*(1), 514–538.

Animesh, A. P., Yang, S. B., & Oh, W. (2011). An odyssey into virtual words: Exploring the impacts of technological and spatial environments on intention to purchase virtual products. *MIS Quarterly, 35*(3), 780–810.

Arı, E., Yılmaz, V., & Dikec, B. E. (2020). An extensive structural model proposal to explain online gaming behaviors. *Entertainment Computing, 34*, Article 100340.

Arpaci, I., & Bahari, M. (2023). A complementary SEM and deep ANN approach to predict the adoption of cryptocurrencies from the perspective of cybersecurity. *Computers in Human Behavior, 143*, Article 107678.

Baabdullah, A. M. (2018). Consumer adoption of mobile social network games (M-SNGs) in Saudi arabia: The role of social influence, hedonic motivation and trust. *Technology in Society, 53*, 91–102.

Bangladesh Telecommunication Regulatory Commission (BTRC). (2020). Internet subscribers in Bangladesh january 2020. http://www.btrc.gov.bd/telco/internet. *retrieved 29 July 2020*.

Bauer, C., & Strauss, C. (2016). Location-based advertising on mobile devices. *Management Review Quarterly, 66*(3), 159–194.

Becker, J. M., Klein, K., & Wetzels, M. (2012). Hierarchical latent variable models in PLS-SEM: Guidelines for using reflective-formative type models. *Long Range Planning, 45*(5–6), 359–394.

Bergman, M. M. (2020). *"Mixed method and multimethod research and design"* (Vol. 437). The SAGE Handbook of Political Science.

Bitrián, P., Buil, I., & Catalán, S. (2021). Enhancing user engagement: The role of gamification in mobile apps. *Journal of Business Research, 132*, 170–185.

Bourgonjon, J., Valcke, M., Soetaert, R., & Schellens, T. (2010). Students' perceptions about the use of video games in the classroom. *Computers & Education, 54*(4), 1145–1156.

Breitkreuz, K. R., Kardong-Edgren, S., Gilbert, G. E., DeBlieck, C., Maske, M., Hallock, C., et al. (2021). A multi-site study examining the usability of a virtual reality game designed to improve retention of sterile catheterization skills in nursing students. *Simulation & Gaming, 52*(2), 169–184.

Brockmyer, J. H., Fox, C. M., Curtiss, K. A., McBroom, E., Burkhart, K. M., & Pidruzny, J. N. (2009). The development of the game engagement questionnaire: A measure of engagement in video game-playing. *Journal of Experimental Social Psychology, 45*(4), 624–634.

de Canio, F., Fuentes-Blasco, M., & Martinelli, E. (2021). Engaging shoppers through mobile apps: The role of gamification. *International Journal of Retail & Distribution Management, 49*(7), 919–940.

Carlson, J., de Vries, N. J., Rahman, M. M., & Taylor, A. (2017). Go with the flow: Engineering flow experiences for customer engagement value creation in branded social media environments. *Journal of Brand Management, 24*, 334–348.

Chan, F. T., & Chong, A. Y. (2012). A SEM-neural network approach for understanding determinants of interorganizational system standard adoption and performances. *Decision Support Systems, 54*(1), 621–630.

Chen, L. (2022). The rise of the east asian gaming industry: A value-added chain among the east asian game companies during 2000–2010. *Global Media and China, 7*(1), 24–42.

Chen, Y. M., Hsu, T. H., & Lu, Y. J. (2018). Impact of flow on mobile shopping intention. *Journal of Retailing and Consumer Services, 41*, 281–287.

Cheung, M. L., Leung, W. K., Chang, L. M., & Shi, S. (2021). "Driving loyalty intentions of mobile games: A motivation theory perspective". *Quality and Quantity*, 1–26.

Choi, D., & Kim, J. (2004). Why people continue to play online games: In search of critical design factors to increase customer loyalty to online contents. *CyberPsychology and Behavior, 7*(1), 11–24.

Chong, A. Y. L. (2013). A two-staged SEM-neural network approach for understanding and predicting the determinants of m-commerce adoption. *Expert Systems with Applications, 40*(4), 1240–1247.

Chou, T. J., & Ting, C. C. (2003). The role of flow experience in cyber-game addiction. *CyberPsychology and Behavior, 6*(6), 63–675.

Csikszentmihalyi, M. (1975a). Play and intrinsic rewards. *The Humanistic Psychologist, 15*(3), 41–63.

Csikszentmihalyi, M. (1975b). *"Beyond boredom and anxiety"*. San Francisco CA: Jossey-Bass.

Csikszentmihalyi, M., & Csikszentmihalyi, I. S. (1988). "Introduction to Part IV" in. In M. Csikszentmihalyi, & I. S. Csikszentmihalyi (Eds.), *Optimal experience: Psychological studies of flow in consciousness*. New York NY: Cambridge University Press.

Csikszentmihalyi, M., & LeFevre, J. (1989). Optimal experience in work and leisure. *Journal of Personality and Social Psychology, 56*(5), 815.

Csikzentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper Collins.

Dahabiyeh, L., Najjar, M. S., & Agrawal, D. (2021). When ignorance is bliss: The role of curiosity in online games adoption. *Entertainment Computing, 37*, Article 100398.

Dale, G., & Shawn Green, C. (2017). The changing face of video games and video gamers: Future directions in the scientific study of video game play and cognitive performance. *Journal of Cognitive Enhancement, 1*(3), 280–294.

Davis, F. D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology". *MIS Quarterly*, 319–340.

Débordès, J. B., Caporossi, G., & Larocque, D. (2021). Is my cross-promotion profitable? Evaluation of game-to-game cannibalization in free-to-play mobile games. *Journal of Marketing Analytics, 9*(3), 173–184.

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71–75.

Duarte, P., & Amaro, S. (2018). Methods for modelling reflective-formative second order constructs in PLS: An application to online travel shopping. *Journal of Hospitality and Tourism Technology, 9*(3), 295–313.

Engl, S., & Nacke, L. E. (2013). Contextual influences on mobile player experience – a game user experience model. *Entertainment Computing, 4*(1), 83–91.

Fernandes, A., Brandao, M. M., Lopes, E. L., & Quevedo-Silva, F. (2020). Satisfaction and attitudinal responses: Indirect effects of involvement and reputation. *RAUSP Management Journal, 55*(1), 70–85.

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research, 18*(3), 382–388.

Franke, G., & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: A comparison of four procedures. *Internet Research, 29*(3), 430–447.

Garson, G. D. (1998). *"Neural networks: An introductory guide for social scientists"*. Thousand Oaks: Sage.

Ghosh, T., Sreejesh, S., & Dwivedi, Y. K. (2021). Examining the deferred effects of gaming platform and game speed of advergames on memory, attitude, and purchase intention. *Journal of Interactive Marketing, 55*, 52–66.

Goh, C., Jones, C., & Copello, A. (2019). A further test of the impact of online gaming on psychological wellbeing and the role of play motivations and problematic use. *Psychiatric Quarterly, 90*(4), 747–760.

Gros, L., Debue, N., Lete, J., & Van de Leemput, C. (2020). Video game addiction and emotional states: Possible confusion between pleasure and happiness? *Frontiers in Psychology, 10*, 2894.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). *"A primer on partial least squares structural equation modeling (PLS-SEM)"*. Sage publications.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report PLS-SEM results. *European Business Review, 31*(1), 2–24.

Hamari, J., Malik, A., Koski, J., & Johri, A. (2019). Uses and gratifications of pokémon go: Why do people play mobile location-based augmented reality games? *International Journal of Human-Computer Interaction, 35*(9), 804–819.

Harman, D. (1967). A single factor test of common method variance. *Journal of Psychology, 35*, 359–378.

Harmeling, C. M., Moffett, J. W., Arnold, M. J., & Carlson, B. D. (2017). Toward a theory of customer engagement marketing. *Journal of the Academy of Marketing Science, 45*, 312–335.

Hasan, M. (2023). Internet subscriber base sees growth for 4th month straight. The Daily Star. https://www.thedailystar.net/business/economy/news/internet-subscriber-base-sees-growth-4th-month-straight-3361206.

Hellström, C., Nilsson, K. W., Leppert, J., & Åslund, C. (2015). Effects of adolescent online gaming time and motives on depressive, musculoskeletal, and psychosomatic symptoms. *Upsala Journal of Medical Sciences, 120*(4), 263–275.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity invariance-based structural equation modelling. *Journal of the Academy of Marketing Science, 43*(1), 115–135.

de Hesselle, L. C., Rozgonjuk, D., Sindermann, C., Pontes, H. M., & Montag, C. (2021). The associations between Big Five personality traits, gaming motives, and self-reported time spent gaming. *Personality and Individual Differences, 171*, Article 110483.

Hew, J. J., Badaruddin, M. N. B. A., & Moorthy, M. K. (2017). Crafting a smartphone repurchase decision making process: Do brand attachment and gender matter? *Telematics and Informatics, 34*(4), 34–56.

Hew, T. S., Leong, L. Y., Ooi, K. B., & Chong, A. Y. L. (2016). Predicting drivers of mobile entertainment adoption: A two-stage SEM-artificial-neural-network analysis. *Journal of Computer Information Systems, 56*(4), 352–370.

Hibben, K. C., Felderer, B., & Conrad, F. G. (2022). Respondent commitment: Applying techniques from face-to-face interviewing to online collection of employment data. *International Journal of Social Research Methodology, 25*(1), 15–27.

Hilvert-Bruce, Z., & Neill, J. T. (2020). I'm just trolling: The role of normative beliefs in aggressive behaviour in online gaming. *Computers in Human Behavior, 102*, 303–311.

Hoffman, D. L., & Novak, T. P. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *Journal of Marketing, 60*(3), 50–68.

Hoffman, D. L., & Novak, T. P. (2009). Flow online: Lessons learned and future prospects. *Journal of Interactive Marketing, 23*(1), 23–34.

Ho, L. A., & Kuo, T. H. (2010). How can one amplify the effect of e-learning? An examination of high-tech employees' computer attitude and flow experience. *Computers in Human Behavior, 26*(1), 23–31.

Hollebeek, L. D., Glynn, M. S., & Brodie, R. J. (2014). Consumer brand engagement in social media: Conceptualization, scale development and validation. *Journal of Interactive Marketing, 28*(2), 149–165.

Hoque, A. S. M. M. (2018). Digital device addiction effect on lifestyle of generation Z in Bangladesh. *Asian People Journal (APJ), 1*(2), 21–44.

Houben, M., Van Den Noortgate, W., & Kuppens, P. (2015). The relation between short-term emotion dynamics and psychological well-being: A meta-analysis. *Psychological Bulletin, 141*(4), 901.

Hsiao, K. L., & Chen, C. C. (2016). What drives in-app purchase intention for mobile games? An examination of perceived values and loyalty. *Electronic Commerce Research and Applications, 16*, 18–29.

Hsu, C. L., Chang, K. C., & Chen, M. C. (2012). The impact of website quality on customer satisfaction and purchase intention: Perceived playfulness and perceived flow as mediators. *Information Systems and E-Business Management, 10*, 549–570.

Hsu, C. L., & Lu, H. P. (2004). Why do people play on-line games? An extended TAM with social influences and flow experience. *Information & Management, 41*(7), 853–868.

Hsu, C. L., & Lu, H. P. (2007). Consumer behavior in online game communities: A motivational factor perspective. *Computers in Human Behavior, 23*(3), 1642–1659.

Huang, E. (2012). Online experiences and virtual goods purchase intention. *Internet Research, 22*(3), 252–274.

Huang, Y. C., Backman, S. J., & Backman, K. F. (2010). Student attitude towards virtual learning in second life: A flow theory approach. *Journal of Teaching in Travel & Tourism, 10*(4), 312–334.

Huang, L., & Hsieh, Y. (2011). Predicting online game loyalty based on need gratification and experiential motives. *Internet Research, 21*(5), 581–598.

Huang, G. H., & Korfiatis, N. (2015). Trying before buying: The moderating role of online reviews in trial attitude formation towards mobile applications. *International Journal of Electronic Commerce, 19*(4), 77–111.

Huang, H. C., Pham, T. T. L., Wong, M. K., Chiu, H. Y., Yang, Y. H., & Teng, C. I. (2018). How to create flow experience in exergames? Perspective of flow theory. *Telematics and Informatics, 35*(5), 1288–1296.

Huang, V., Young, M., & Fiocco, A. J. (2017). The association between video game play and cognitive function: Does gaming platform matter? *Cyberpsychology, Behavior, and Social Networking, 20*(11), 689–694.
Hudson, D., Seah, L. H., Hite, D., & Haab, T. (2004). Telephone presurveys, self-selection, and non-response bias to mail and internet surveys in economic research. *Applied Economics Letters, 11*(4), 237–240.
Hussain, N. (2021). "Meet the indie studios fuelling the mobile games industry of Bangladesh". https://www.thedailystar.net/toggle/news/meet-the-indie-studios-fuelling-the-mobile-games-industry-bangladesh-2919501.
Ilsever, J., Cyr, D., & Parent, M. (2007). Extending models of flow and e-loyalty. *Journal of Information Science and Technology, 4*(2), 3–22.
Jakir, H. (2021). "Bangladesh's mobile games industry is growing: New jobs are being created in this arena with foreign investment coming in". https://www.tbsnews.net/tech/bangladeshs-mobile-games-industry-growing-334675.
Jang, S., & Liu, Y. (2020). Continuance use intention with mobile augmented reality games: Overall and multigroup analyses on pokémon go. *Information Technology & People, 33*(1), 37–55.
Javornik, A. (2016). Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behaviour. *Journal of Retailing and Consumer Services, 30*, 252–261.
Jordan, P. J., & Troth, A. C. (2020). Common method bias in applied settings: The dilemma of researching in organizations. *Australian Journal of Management, 45*(1), 3–14.
Joseph, S., & Diack, L. (2015). Playing interprofessional games: Reflections on using the interprofessional education game (iPEG). *Journal of Interprofessional Care, 29*(3), 260–262.
Jung, Y., Perez-Mira, B., & Wiley-Patton, S. (2009). Consumer adoption of mobile TV: Examining psychological flow and media content. *Computers in Human Behavior, 25*(1), 123–129.
Kang, J.-W., Lee, H., & Namkung, Y. (2018). The impact of restaurant patrons' flow experience on SNS satisfaction and offline purchase intentions. *International Journal of Contemporary Hospitality Management, 30*(2), 797–816.
Kim, M. (2021). Does playing a video game really result in improvements in psychological well-being in the era of COVID-19? *Journal of Retailing and Consumer Services, 61*, Article 102577.
Kim, S., & Baek, T. H. (2018). Examining the antecedents and consequences of mobile app engagement. *Telematics and Informatics, 35*(1), 148–158.
Kim, Y. J., & Han, J. (2014). Why smartphone advertising attracts customers: A model of web advertising, flow, and personalization. *Computers in Human Behavior, 33*, 256–269.
Kim, J., & Kim, M. (2020). Spectator e-sport and well-being through live streaming services. *Technology in Society, 63*, Article 101401.
Kim, M., & Kim, H. M. (2022). What online game spectators want from their twitch streamers: Flow and well-being perspectives. *Journal of Retailing and Consumer Services, 66*, Article 102951.
Kim, Y. H., Kim, D. J., & Wachter, K. (2013). A study of mobile user engagement (MoEN): Engagement motivations, perceived value, satisfaction, and continued engagement intention. *Decision Support Systems, 56*, 361–370.
Kim, D., & Ko, Y. J. (2019). The impact of virtual reality (VR) technology on sport spectators' flow experience and satisfaction. *Computers in Human Behavior, 93*, 346–356.
Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behaviour. *Information Systems Research, 13*(2), 205–223.
Kunkel, T., Lock, D., & Doyle, J. P. (2021). Gamification via mobile applications: A longitudinal examination of its impact on attitudinal loyalty and behavior towards a core service. *Psychology and Marketing, 38*(6), 948–964.
Kuo, Y. F., & Feng, L. H. (2013). Relationships among community interaction characteristics, perceived benefits, community commitment, and oppositional brand loyalty in online brand communities. *International Journal of Information Management, 33*(6), 948–962.
Kuo, Y. F., & Yen, S. N. (2009). Towards an understanding of the behavioral intention to use 3G mobile value-added services. *Computers in Human Behavior, 25*(1), 103–110.
Kuss, D. J., & Griffiths, M. D. (2012). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions, 1*(1), 3–22.
Laato, S., Rauti, S., Islam, A. N., & Sutinen, E. (2021). Why playing augmented reality games feels meaningful to players? The roles of imagination and social experience. *Computers in Human Behavior, 121*, Article 106816.
Lee, S. M., & Chen, L. (2010). *"The impact of flow on online consumer behaviour"*. Computer Information Systems. Summer.
Leong, L. Y., Hew, T. S., Ooi, K. B., & Wei, J. (2020). Predicting mobile wallet resistance: A two-staged structural equation modeling-artificial neural network approach. *International Journal of Information Management, 51*, Article 102047.
Leong, L. Y., Hew, T. S., Tan, G. W. H., & Ooi, K. B. (2013). Predicting the determinants of the NFC-enabled mobile credit card acceptance: A neural networks approach. *Expert Systems with Applications, 40*(14), 5604–5620.
Liao, G.-Y., Cheng, T. C. E., & Teng, C.-I. (2019). How do avatar attractiveness and customization impact online gamers' flow and loyalty? *Internet Research, 29*(2), 349–366.
Liao, S. H., & Chiu, W. L. (2021). Investigating the behaviors of mobile games and online streaming users for online marketing recommendations. *International Journal of Online Marketing, 11*(1), 39–61.
Li, D., & Browne, G. J. (2006). The role of need for cognition and mood in online flow experience. *Journal of Computer Information Systems, 46*(3), 11–17.
Liébana-Cabanillas, F., Marinkovic, V., de Luna, I. R., & Kalinic, Z. (2018). Predicting the determinants of mobile payment acceptance: A hybrid SEM-neural network approach. *Technological Forecasting and Social Change, 129*, 117–130.
Liébana-Cabanillas, F., Marinković, V., & Kalinić, Z. (2017). A SEM-neural network approach for predicting antecedents of m-commerce acceptance. *International Journal of Information Management, 37*(2), 14–24.
Liébana-Cabanillas, F., Marinković, V., & Kalinin, Z. (2017). A SEM-neural network approach for predicting antecedents of m-commerce acceptance. *International Journal of Information Management, 37*(2), 4–24.
Lin, J., Lin, S., Turel, O., & Xu, F. (2020). The buffering effect of flow experience on the relationship between overload and social media users' discontinuance intentions. *Telematics and Informatics, 49*, Article 101374.
Liu, C.-C. (2017). A model for exploring players flow experience in online games. *Information Technology & People, 30*(1), 139–162.
Liu, Y., & Li, H. (2011). Exploring the impact of use context on mobile hedonic services adoption: An empirical study on mobile gaming in China. *Computers in Human Behavior, 27*(2), 890–898.
Lo, P. S., Dwivedi, Y. K., Tan, G. W. H., Ooi, K. B., Aw, E. C. X., & Metri, B. (2022). Why do consumers buy impulsively during live streaming? A deep learning-based dual-stage SEM-ANN analysis. *Journal of Business Research, 147*, 325–337.
Marszalek, J. (2006). *Computerized adaptive testing and the experience of flow in examinees"*. IL, United States: University of Illinois at Urbana-Champaign. *PhD dissertation*.
Martins, J., Costa, C., Oliveira, T., Gonçalves, R., & Branco, F. (2019). How smartphone advertising influences consumers' purchase intention. *Journal of Business Research, 94*, 378–387.
Mehra, A., Rajput, S., & Paul, J. (2022). Determinants of adoption of latest version smartphones: Theory and evidence. *Technological Forecasting and Social Change, 175*, Article 121410.
Mok, S. L., & Kwong, C. K. (2002). Application of artificial neural network and fuzzy logic in a case-based system for initial process parameter setting of injection molding. *Journal of Intelligent Manufacturing, 13*(3), 65–176.
Mollen, A., & Wilson, H. (2010). Engagement, telepresence and interactivity in online consumer experience: Reconciling scholastic and managerial perspectives. *Journal of Business Research, 63*(9–10), 919–925.
Muniz, A. M., & O'guinn, T. C. (2001). Brand community. *Journal of Consumer Research, 27*(4), 412–432.
Mustafi, M. A. A., & Hosain, M. S. (2020). The role of online advertising on purchase intention of smartphones: Mediating effects of flow experience and advertising value. *Journal of Contemporary Marketing Science, 3*(3), 385–410.
Nakamura, M. (2019). Influence of room condition on participants in simulation and gaming activities: Analyses of debriefing forms. *Simulation & Gaming, 50*(5), 645–661.
Ndayizigamiye, P., Kante, M., & Shingwenyana, S. (2020). An adoption model of mHealth applications that promote physical activity. *Cogent Psychology, 7*(1), Article 1764703.
Nielsen, J., & Molich, R. (1990). Heuristic evaluation of user interfaces. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Empowering People, 249*, 256.
Novak, T. P., Hoffman, D. L., & Yung, Y. F. (2000). Measuring the customer experience in online environments: A structural modeling approach. *Marketing Science, 19*(1), 22–44.
Nugraha, A. K. N. A., Silintowe, Y. B. R., & Paramita, E. L. (2022). Lifestyle segmentation: Mobile phone purchase vis-à-vis consumption decision. *Business: Theory and Practice, 23*(1), 14–25.
O'Brien, H. L. (2010). The influence of hedonic and utilitarian motivations on user engagement: The case of online shopping experiences. *Interacting with Computers, 22*(5), 344–352.
Oghuma, A. P., Libaque-Saenz, C. F., Wong, S. F., & Chang, Y. (2016). An expectation-confirmation model of continuance intention to use mobile instant messaging. *Telematics and Informatics, 33*(1), 34–47.
Okazaki, S. (2008). Exploring experiential value in online mobile gaming adoption. *CyberPsychology and Behavior, 11*(5), 619–622.
Ooi, K. B., & Tan, G. W. H. (2016). Mobile technology acceptance model: An investigation using mobile users to explore smartphone credit card. *Expert Systems with Applications, 59*, 33–46.
Oparaji, U., Sheu, R. J., Bankhead, M., Austin, J., & Patelli, E. (2017). Robust artificial neural network for reliability and sensitivity analyses of complex non-linear systems. *Neural Networks, 96*, 80–90.
Ortiz, S. M. (2019). "You can say I got desensitized to it": How men of color cope with everyday racism in online gaming". *Sociological Perspectives, 62*(4), 572–588.
Ou, C. C., Chen, K. L., Tseng, W. K., & Lin, Y. Y. (2022). A study on the influence of conformity behaviors, perceived risks, and customer engagement on group buying intention: A case study of community e-commerce platforms. *Sustainability, 14*(4), 1941.
Pace, S. (2003). A grounded theory of the flow experiences of web users. *International Journal of Human-Computer Studies*, 1–45. December 2003.
Pansari, A., & Kumar, V. (2017). Customer engagement: The construct, antecedents, and consequences. *Journal of the Academy of Marketing Science, 45*, 294–311.
Peterson, R. A., & Merunka, D. R. (2014). Convenience samples of college students and research reproducibility. *Journal of Business Research, 67*(5), 1035–1041.
Petty, R. E., & Cacioppo, J. T. (1981). "Issue involvement as a moderator of the effects on attitude of advertising content and context". *ACR North American Advances*.
Piligrimienė, Ž., Žukauskaitė, A., Korzilius, H., Banytė, J., & Dovalienė, A. (2020). Internal and external determinants of consumer engagement in sustainable consumption. *Sustainability, 12*(4), 1349.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(879), 10–1037.
Prentice, C., Han, X. Y., Hua, L. L., & Hu, L. (2019). The influence of identity-driven customer engagement on purchase intention. *Journal of Retailing and Consumer Services, 47*, 339–347.
Priyadarshinee, P., Raut, R. D., Jha, M. K., & Gardas, B. B. (2017). Understanding and predicting the determinants of cloud computing adoption: A two staged hybrid SEM-neural networks approach. *Computers in Human Behavior, 76*, 341–362.
Ragin, C. C. (2009). Qualitative comparative analysis using fuzzy sets (fsQCA). *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques, 51*, 87–121.
Rahman, M. S., Abdel Fattah, F. A. M., Hussain, B., & Hossain, M. A. (2021). An integrative model of consumer-based heritage destination brand equity. *Tourism Review, 76*(2), 358–373.
Ramírez-Correa, P., Rondán-Cataluña, F. J., Arenas-Gaitán, J., & Martín-Velicia, F. (2019). Analysing the acceptation of online games in mobile devices: An application of UTAUT2. *Journal of Retailing and Consumer Services, 50*, 85–93.
Rauschnabel, P. A., Rossmann, A., & Tom Dieck, M. C. (2017). An adoption framework for mobile augmented reality games: The case of pokémon go. *Computers in Human Behavior, 76*, 276–286.
Reer, F., Wehden, L. O., Janzik, R., Tang, W. Y., & Quandt, T. (2022). Virtual reality technology and game enjoyment: The contributions of natural mapping and need satisfaction. *Computers in Human Behavior, 132*, Article 107242.
Rezaei, S., Shahijan, M. K., Amin, M., & Ismail, W. K. W. (2016). Determinants of app stores continuance behavior: A PLS path modelling approach. *Journal of Internet Commerce, 15*(4), 408–440.
Rice, R., & Hancock, L. (2005). The mall intercept: A social norms marketing research tool. *The Report on Social Norms, 4*(7), 4–7.
Ringle, C. M., Sarstedt, M., Mitchell, R., & Gudergan, S. P. (2020). Partial least squares structural equation modeling in HRM research. *International Journal of Human Resource Management, 31*(12), 1617–1643.
Rosendo-Rios, V., Trott, S., & Shukla, P. (2022). "Systematic literature review online gaming addiction among children and young adults: A framework and research agenda". *Addictive Behaviors*, Article 107238.
Salo, J. (2015). Mobile game advertising recall in pre-and post-game experience. In *International conference on marketing and business development* (Vol. 1, pp. 261–273). Bucharest University of Economic Studies Publishing House, 1.
Sarkar, A., & Sarkar, J. G. (2023). "Gift of fantasy: investigating how fantasy in digital game impacts game brand immersion". *Information Technology & People, 36*(2), 661–682. https://doi.org/10.1108/ITP-11-2020-0809. Vol. ahead-of-print No. ahead-of-print.
Sarstedt, M., Ringle, C. M., Cheah, J. H., Ting, H., Moisescu, O. I., & Radomir, L. (2020). Structural model robustness checks in PLS-SEM. *Tourism Economics, 26*(4), 531–554.
Schänzel, D., Taylor-Giles, L. C., & Turner, J. (2022). Gamifying kindness: Towards a praxis of the ephemeral. In *Games and narrative: Theory and practice* (pp. 61–76). Springer.
Schiopu, A. F., Hornoiu, R. I., Padurean, A. M., & Nica, A. M. (2022). Constrained and virtually traveling? Exploring the effect of travel constraints on intention to use virtual reality in tourism. *Technology in Society, 71*, Article 102091.
Scott, J. E., & Walczak, S. (2009). Cognitive engagement with a multimedia ERP training tool: Assessing computer self-efficacy and technology acceptance. *Information & Management, 46*(4), 221–232.
Shahzad, F., Xiu, G., Khan, M. A. S., & Shahbaz, M. (2020). Predicting the adoption of a mobile government security response system from the user's perspective: An application of the artificial neural network approach. *Technology in Society, 62*, Article 101278.
Sharma, S. K. (2019). Integrating cognitive antecedents into TAM to explain mobile banking behavioral intention: A SEM-neural network modelling. *Information Systems Frontiers, 21*(4), 815–827.
Sharma, A., Dwivedi, Y. K., Arya, V., & Siddiqui, M. Q. (2021). Does sms advertising still have relevance to increase consumer purchase intention? A hybrid PLS-SEM-neural network modelling approach. *Computers in Human Behavior, 124*, Article 106919.
Sheldon, K. M., & Prentice, M. (2019). Self-determination theory as a foundation for personality researchers. *Journal of Personality, 87*(1), 5–14.
Shiau, W.-L., & Huang, L.-C. (2023). "Scale development for analyzing the fit of real and virtual world integration: an example of Pokémon Go". *Information Technology & People, 36*(2), 500–531. https://doi.org/10.1108/ITP-11-2020-0793. ahead-of-print No. ahead-of-print.
Simon, B. (2004). *"Identity in modern society: A social psychological perspective"*. Oxford: Blackwell.
Skadberg, Y. X., & Kimmel, J. R. (2004). Visitors' flow experience while browsing a web site: Its measurement, contributing factors and consequences. *Computers in Human Behavior, 20*(3), 403–422.
Smironva, E., Kiatkawsin, K., Lee, S. K., Kim, J., & Lee, C. H. (2020). Self-selection and non-response biases in customers' hotel ratings–a comparison of online and offline ratings. *Current Issues in Tourism, 23*(10), 1191–1204.
Smith, L. J., Gradisar, M., King, D. L., & Short, M. (2017). Intrinsic and extrinsic predictors of video-gaming behaviour and adolescent bedtimes: The relationship between flow states, self-perceived risk-taking, device accessibility, parental regulation of media and bedtime. *Sleep Medicine, 30*, 64–70.
Spears, N., & Singh, S. N. (2004). Measuring attitude towards the brand and purchase intentions. *Journal of Current Issues and Research in Advertising, 26*(2), 53–66.
Sternad Zabukovšek, S., Kalinic, Z., Bobek, S., & Tominc, P. (2019). SEM-ANN based research of factors' impact on extended use of ERP systems. *Central European Journal of Operations Research, 27*(3), 703–735.
Stolte, M., Kroesbergen, E. H., & Van Luit, J. E. (2019). Inhibition, friend or foe? Cognitive inhibition as a moderator between mathematical ability and mathematical creativity in primary school students. *Personality and Individual Differences, 142*, 196–201.
Streukens, S., & Leroi-Werelds, S. (2016). Bootstrapping and PLS-SEM: A step-by-step guide to get more out of your bootstrap results. *European Management Journal, 34*(6), 618–632.
Suci, A., Wang, H. C., & Doong, H. S. (2022). Green advertising: Examining the effects of appeal arrangement on young Indonesian consumers' green attitudes and buying intention. *Asian Journal of Communication*, 1–25.
Tan, G. W. H., Ooi, K. B., Leong, L. Y., & Lin, B. (2014). Predicting the drivers of behavioral intention to use mobile learning: A hybrid SEM-neural networks approach. *Computers in Human Behavior, 36*, 198–213.
The Financial Express. (2020). Number of internet users crosses 103 million in Bangladesh. https://thefinancialexpress.com.bd/trade/number-of-internet-users-crosses-103-million-in-bangladesh-1596786757.
Thissen, B. A., Menninghaus, W., & Schlotz, W. (2021). The pleasures of reading fiction explained by flow, presence, identification, suspense, and cognitive involvement. *Psychology of Aesthetics, Creativity, and the Arts, 15*(4), 710.
Toor, A., Husnain, M., & Hussain, T. (2017). The impact of social network marketing on consumer purchase intention in Pakistan: Consumer engagement as a mediator. *Asian Journal of Business and Accounting*, 167–199.
Venkatesan, R. (2017). Executing on a customer engagement strategy. *Journal of the Academy of Marketing Science, 45*, 289–293.
Vivek, S. D., Beatty, S. E., Dalela, V., & Morgan, R. M. (2014). A generalized multidimensional scale for measuring customer engagement. *Journal of Marketing Theory and Practice, 22*(4), 401–420.
Vizcaíno-González, M., Pineiro-Chousa, J., & Sáinz-González, J. (2017). Selecting explanatory factors of voting decisions by means of fsQCA and ANN. *Quality and Quantity, 51*(5), 2049–2061.
Wang, J., & Senecal, S. (2007). Measuring perceived website usability. *Journal of Internet Commerce, 6*(4), 97–112.
Wang, G., Tan, G. W. H., Yuan, Y., Ooi, K. B., & Dwivedi, Y. K. (2022). Revisiting TAM2 in behavioral targeting advertising: A deep learning-based dual-stage SEM-ANN analysis. *Technological Forecasting and Social Change, 175*, Article 121345.
Wang, K., Wang, E. T. G., & Farn, C. K. (2009). Influence of web advertising strategies, consumer goal-directedness, and consumer involvement on web advertising effectiveness. *International Journal of Electronic Commerce, 13*(4), 67–95.
Weedige, S. S., Ouyang, H., Gao, Y., & Liu, Y. (2019). Decision making in personal insurance: Impact of insurance literacy. *Sustainability, 11*(23), 6795.
Wehden, L. O., Reer, F., Janzik, R., Tang, W. Y., & Quandt, T. (2021). The slippery path to total presence: How omnidirectional virtual reality treadmills influence the gaming experience. *Media and Communication, 9*(1), 5–16.
Yamaguchi, S. (2023). The relationship between playing video games on mobile devices and well-being in a sample of Japanese adolescents and adults. *SAGE Open Medicine, 11*, Article 20503121221147842.
Yang, Y., Asaad, Y., & Dwivedi, Y. (2017). Examining the impact of gamification on intention of engagement and brand attitude in the marketing context. *Computers in Human Behavior, 73*, 459–469.
Yavuz, M., Çorbacıoğlu, E., Başoğlu, A. N., Daim, T. U., & Shaygan, A. (2021). Augmented reality technology adoption: Case of a mobile application in Turkey. *Technology in Society, 66*, Article 101598.
Yeo, V. C. S., Goh, S. K., & Rezaei, S. (2017). Consumer experiences, attitude and behavioral intention towards online food delivery (OFD) services. *Journal of Retailing and Consumer Services, 35*, 150–162.
Zhang, F., & Kaufman, D. (2017). Massively multiplayer online role-playing games (MMORPGs) and socio-emotional wellbeing. *Computers in Human Behavior, 73*, 451–458.
Zhao, K. (2020). "Sample representation in the social sciences". *Synthese*, 1–19.
Zhao, L., & Lu, Y. (2012). Enhancing perceived interactivity through network externalities: An empirical study on micro-blogging service satisfaction and continuance intention. *Decision Support Systems, 53*(4), 825–834.
Zhou, T. (2013). Understanding the effect of flow on user adoption of mobile games. *Personal and Ubiquitous Computing, 17*(4), 741–748.
Zhu, D. S., Lin, T. C. T., & Hsu, Y. C. (2012). Using the technology acceptance model to evaluate user attitude and intention of use for online games. *Total Quality Management and Business Excellence, 23*(7–8), 965–980.